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Volume 30 Number 6

The International Journal of Medicine in Industry

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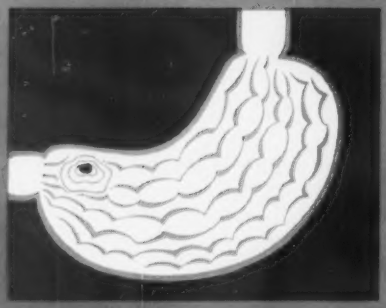

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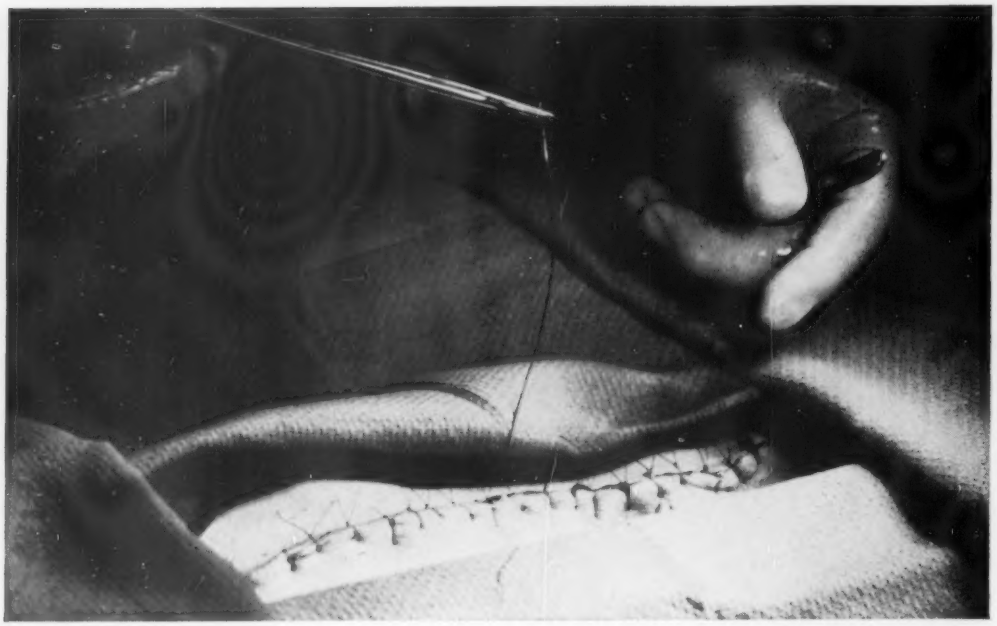

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1. Morani, A. D.: J. Med. Women's Fed. *42*:12, 1960. 2. Cigarroa, L. G.: J. Internat. Coll. Surgeons *34*:442, 1960. 3. Moore, F. T.: Brit. J. Plastic Surg. *11*:335, 1959. 4. Personal Communications to the Medical Department, Armour Pharmaceutical Company, 1959.

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PERSONAL NEWS AND NOTES

HARRY S. GEAR, M.D., an international leader in the field of Hygiene and Tropical Medicine, will become Secretary General of The World Medical Association on July 1, 1961. DR. GEAR is currently the Director of Pneumoconiosis Research, Council for Scientific and Industrial Research — Industrial Medicine, Johannesburg, South Africa.

Of British descent, DR. GEAR received his education at the Universities of Witwatersrand and London; engaged in general practice in London, Rhodesia and South Africa and had hospital and clinic experience in China, the Middle East and Africa.

In military service from 1940 to 1944, DR. GEAR was assigned as Assistant Director of Hygiene, Middle East Force — GHQ in which post he was responsible for coordinating the civil medical and health services of all middle eastern countries with the war effort.

DR. GEAR is author of a number of books and monographs and of many professional papers in the fields of epidemiology, health statistics, industrial health and medical research.

The Occupational Health Division of the Ministry of Labor, Republic of Colombia, is organizing the Third Colombian Occupational Health Seminar, to be held in Cali, Colombia, during the week June 19 to 24, 1961.

DR. FRANK PRINCI, of the Institute of Industrial Health and the Kettering Laboratory of Cincinnati, DR. JACY MONTENEGRO MAGALHAES, President of the Pan-American Union of Industrial Medicine, and MR. CESAR MACHER, of the Institute of Occupational Health of Peru, have been invited to serve as leaders in the discussions.

Occupational health officials from other countries are cordially invited to attend the Seminar in Cali.

Leo Wade, M.D.

LEO WADE, M.D., has been appointed Vice President for Administration and Member of the Sloan-Kettering Institute for Cancer Research. DR. WADE, currently Medical Director of Esso Standard, Division of Humble Oil and Refining Co., will assume the post on July 1.

A native of St. Louis, DR. WADE has been with Standard Oil since 1949. Previously, he was Assistant Professor of Preventive Medicine and Public Health, and of Medicine at the Washington University School of Medicine in St. Louis, from which he received his M.D. degree in 1938.

DR. WADE became Medical Director of Esso Standard Oil in 1951 and continued in that post until his present appointment. He is also Associate Clinical Professor of Industrial Medicine at the New York University-Post-graduate Medical School, and an Associate Attending Physician in Industrial Medicine at the New York University-Bellevue Medical Center.

In July, 1960, DR. WADE acted as Chairman of the Organizing Committee and President of the 13th International Congress on Occupational Health. He is a Fellow of the American Academy of Occupational Medicine, American College of Physicians, American College of Preventive Medicine, American Medical Association, Industrial Medical Association, and New York State Industrial Medical Society, Inc.

LESLIE SILVERMAN, SC.D., Professor of Engineering in Environmental Hygiene, Harvard School of Public Health, has been appointed head of the Department of Industrial Hygiene. DR. SILVERMAN is Director of the Radiological Hygiene Program and a member of the committee on education program of the School of Public Health. He also is a member of the Atomic Energy Commission advisory committee on reactor safeguards.

DR. SILVERMAN succeeds PROFESSOR PHILIP DRINKER, who will retire after 40 years on the Harvard faculty as Professor of Industrial Hygiene, Emeritus, in August.

A specialized graduate training program in chronic disease and occupational hazards is being offered by the Institute of Industrial Health, University of Cincinnati. JOHN J. PHAIR, M.D., Director of the University's Division of Preventive Medicine, has announced that the graduate program will start immediately. Open to physicians and qualified nonmedical personnel, the program will lead to either a master or doctor of science degree. Emphasis will be on epidemiological investigations and biostatistical and mathematical applications in the solution of industrial problems. This program is being supported by a grant from the Public Health Service.

Those interested should apply to the Institute of Industrial Health, University of Cincinnati.

CAPTAIN ASHTON GRAYBIEL, MC, USN, research specialist in aviation and space medicine has been presented the 1961 Eric J. Liljencrantz Award for his studies on the physiological effects of space flight.

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The Liljencrantz Award is presented annually by the Aerospace Medical Association for important contributions to the medical aspects of acceleration and high altitude. Sponsored by Chas. Pfizer & Co., Inc. of New York, the award commemorates the late COMMANDER ERIC J. LILJENCRANTZ, a Navy physician who was killed while powerdiving a plane in a test of new equipment at Pensacola. The award was established in 1957.

DR. GRAYBIEL has specialized in aviation and space medicine since entering military service in 1942. His work is of theoretical importance for elucidating certain neurophysiological mechanisms. DR. GRAYBIEL'S procedures can be applied in the selection, indoctrination, and preconditioning of space personnel and bear on studies of the cause and control of motion sickness.

He is the recipient of the Theodore C. Lyster Award (1950) for researches in aviation medicine; the Legion of Merit (1952) for contributions to aviation medicine, and the Navy League Admiral S. Parsons Award (1960) for scientific and technical progress.

He is a past president of the American College of Cardiology and of the Aerospace Medical Association, and is an Associate Professor of Medicine at the University of Alabama Medical School.

Garfield F. Hawlick, M.D.

GARFIELD F. HAWLICK, M.D. has been appointed Director of the Examination Clinic at The Colorado Fuel and Iron Corporation's Pueblo Plant, according to DAVID W. BOYER, M.D., Chief Surgeon for CF&I's Emergency Hospital.

DR. HAWLICK joined CF&I in 1940 as physician for the Corporation's iron ore mine in Sunrise, Wyoming, but has been in private practice since 1946.

A native of Minnesota, DR. HAWLICK received his M.D. degree from the University of Nebraska's School of Medicine in Omaha.

HOWARD D. FISHBURN, M.D., a career officer of the Public Health Service, has been appointed Chief Medical Officer of the U. S. Coast Guard. The appointment was announced by Surgeon General LUTHER L. TERRY, of the Public Health Service, U. S. Department of Health, Education, and Welfare.

DR. FISHBURN succeeds KENNETH R. NELSON, M.D. who has retired from the Service to accept the position of Commissioner of Hospitals for the city of St. Louis, Missouri.

Prior to the appointment, DR. FISHBURN was Chief of Surgical Services at the U. S. Public Health Service Hospital, Baltimore, Maryland, where he served since 1948.

"Health problems of the American People" was the theme of a discussion held at the annual meeting in Miami, Florida, on May 8, of the American College of Physicians, when a panel of members of the College with representatives of industry discussed health problems that are applicable to an industrialized society.

Panel members and their subjects were as follows:

JAMES P. BAKER, M.D., F.A.C.P., Medical Director, The Greenbrier Clinic, White Sulphur Springs, W. Va., "A Discussion of Executive Health."

LEMUEL C. McGEE, M.D., F.A.C.P., Medical Director, Hercules Powder Co., Wilmington, Del., "The Meanings of Positive Health and What Physicians Are Doing To Promote It."

NORMAN PLUMMER, M.D., F.A.C.P., General Medical Director, New York Telephone Company, New York City, "The Health of the Worker."

HOWARD A. RUSK, M.D., F.A.C.P., Director, Institute of Physical

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WILLIAM B. TERHUNE, M.D., F.A.C.P., Medical Director, Silver Hill Foundation, New Canaan, Conn., "'Emotional Check-up' for Executives."

Industrial Hygiene Foundation and the Division of Occupational Health of the Public Health Service will again conduct a two-week training course for industrial hygiene engineers and chemists, September 11-22, at the Mellon Institute, Pittsburgh, Pa. The instructors for the course are all specialists in their fields.

The program will consist of laboratory instructions and lectures. The laboratory work is designed to give the students an opportunity to prepare known concentrations of contaminants, make air flow calibrations of air sampling equipment, use the various instruments in determining a number of individual substances, and make dust counts. The laboratory work will also include making ventilation measurements such as air flow in ducts as they relate to local exhaust systems, and ventilation design problems. Lectures and demonstrations will deal with pneumoconiosis, toxicology, noise, radiation, and general discussion of industrial hygiene practice.

Tuition for the course will be $150. The enrollment is limited to 12 persons.

COLONEL EDWARD J. DEHNÉ, Director of the Department of Preventive Medicine at the Medical Field Service School, Brooke Army Medical Center, Fort Sam Houston, Texas, has been authorized the coveted "A" prefix which is the highest recognition of professional proficiency award to military personnel.

COLONEL DEHNÉ came to Brooke Army Medical Center for duty in September, 1960, from Headquarters, Second U. S. Army at Fort George G. Meade, Maryland, where he was Chief of Preventive Medicine.

One of the Army's foremost authorities in preventive and occupational medicine, COLONEL DEHNÉ has developed modern medical training programs to keep pace with the new weapons systems, both adopted and still under study. These include programs in occupational medicine; radiological, industrial, and environmental hygiene.

COLONEL DEHNÉ is a Charter Fellow of the American College of Preventive Medicine, a Fellow in the American Public Health Association, American Medical Association, Industrial Medicine Association, and the Royal Society of Health in England. He is a member of the Founders Group of the American Board of Occupational Medicine, a Diplomat of the American Board of Preventive Medicine and Public Health, Inc., and a charter member of the Civil Affairs Military Government Public Health Association. He is also a Director of the American Conference of Government Industrial Hygienists.

More than 5,000 public health specialists from this country and abroad are expected to attend the 89th annual meeting of the American Public Health Association and meetings of about 60 related organizations at Cobo Hall in Detroit, Mich., November 13-17. Registration will be open to nonmembers.

JOSEPH G. MOLNER, M.D., Health Commissioner of Detroit, is chairman of the local arrangements committee. Scientific sessions and exhibits will cover community health, prevention of disease and control of environmental health factors. The association's 14 sections, each of which will hear progress reports from outstanding researchers and practitioners, represent dental health, engineering and sanitation, epidemiology, food and nutrition, health officers, laboratory, maternal and child health, medical care, mental health, occupational health, public health education, public health nursing, school health and statistics.

The 1961 Scientific Session of the American Cancer Society will be held at the Biltmore Hotel, New York City, October 23-24, 1961. The topic will be "The Physician and the Total Care of the Cancer Patient." For further information, write Professional Education Section, American Cancer Society, 521 West 57 Street, New York 19.

Died

ONIS H. HORRALL, M.D., F.A.C.S., 72, Chicago, Ill., on April 1, 1961. For 32 years the Chief Surgeon of the Chicago, Burlington and Quincy Railroad, DR. HORRALL also was an instructor in surgery at Northwestern University Medical School. He served as surgeon for the American Bus Lines and the Valier Coal Company, and was a consultant for the Union Pacific Railroad. He received his medical degree from Rush Medical College in 1920, and a Ph.D. degree from the University of Chicago in 1927.

THOMAS L. MILLS, M.D., 93, of Zachary, La., on October 18. A member of the Louisiana House of Representatives for many years, he was surgeon for the Illinois Central Railroad for over 50 years. He graduated from the Medical Department of Tulane University.

CHAUNCEY G. SCHUYLER, M.D., 61, of Harvard, Ill., on November 26, 1960. DR. SCHUYLER was a physician for the Chicago and Northwestern Railroad and for the Bowman Dairy Company. He graduated from the Loyola University School of Medicine, and was also a graduate in dentistry.

JOSEPH W. SCOTT, M.D., 54, Roscoe, Pa., on December 5, 1960. DR. SCOTT was plant physician for the Allenport plant of Pittsburgh Steel Company. A graduate of the University of Pittsburgh School of Medicine, he served with the U. S. Navy Reserve during World War II.

HENRY O. WALKER, M.D., 82, Newport, Ark., on December 14, 1960. Before his retirement DR. WALKER was for many years physician for the Missouri Pacific Railroad; he served as Mayor of Newport and as secretary of the county medical society.

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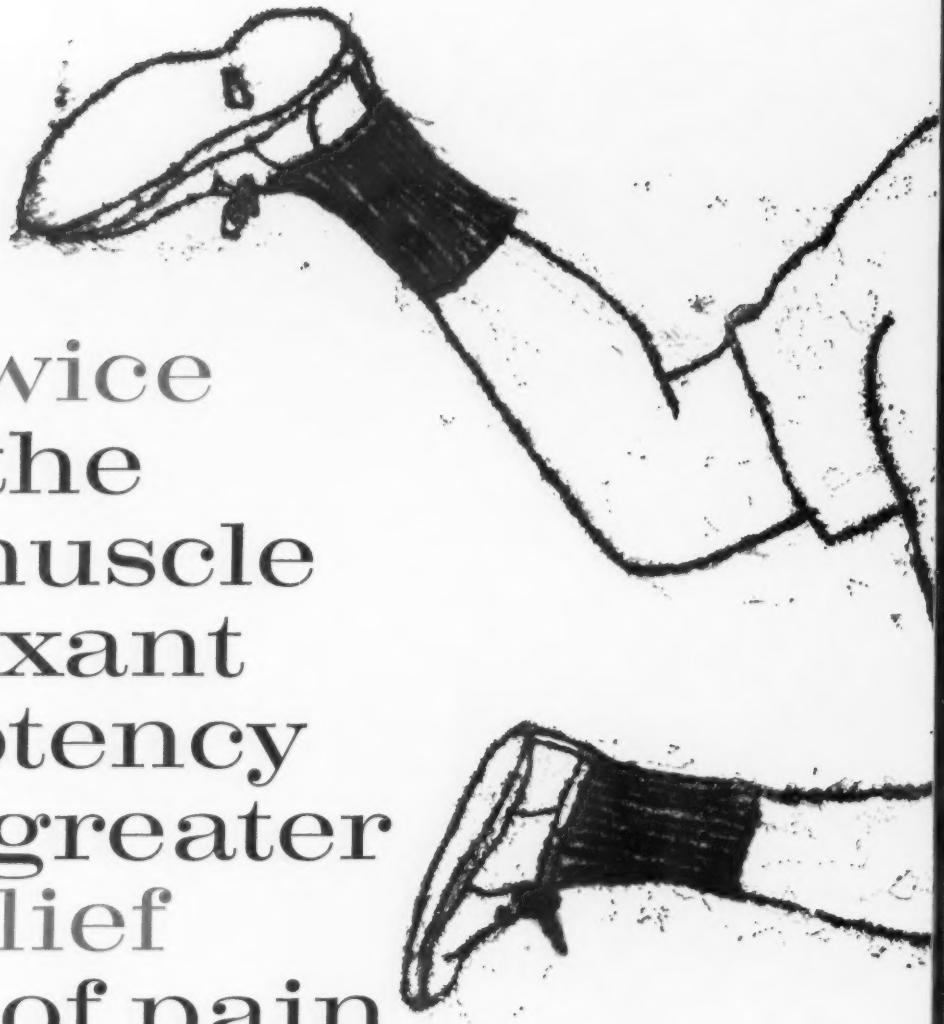

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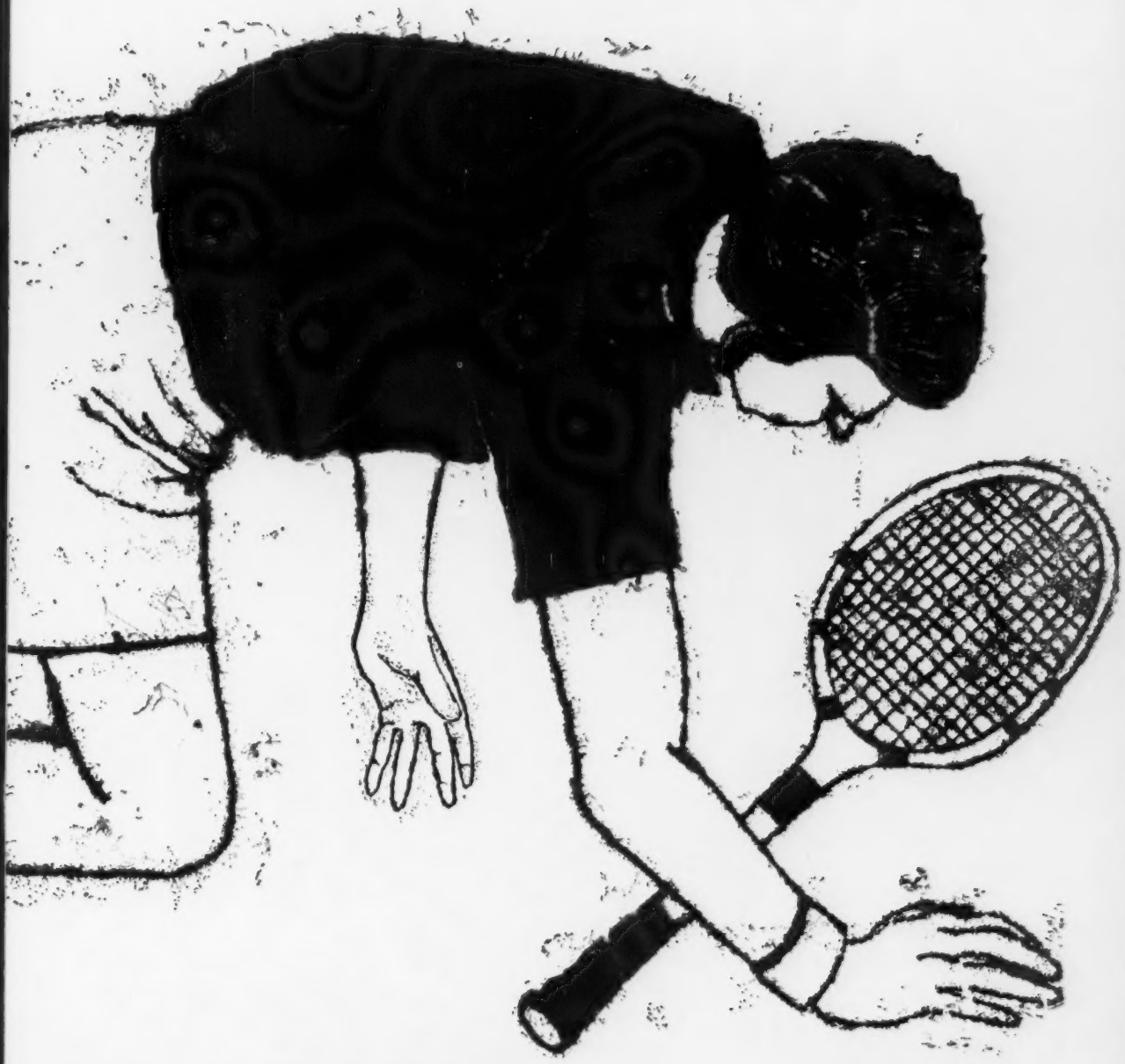

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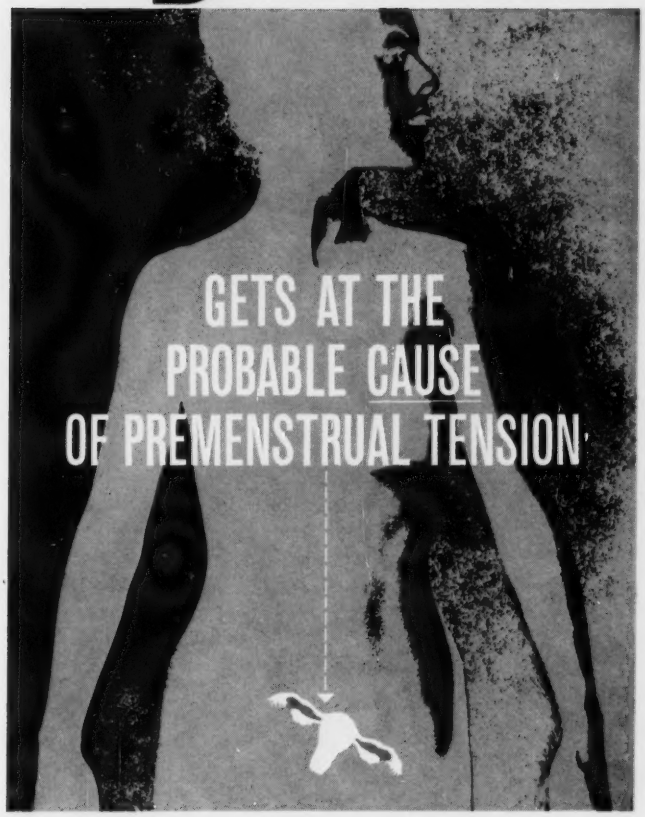

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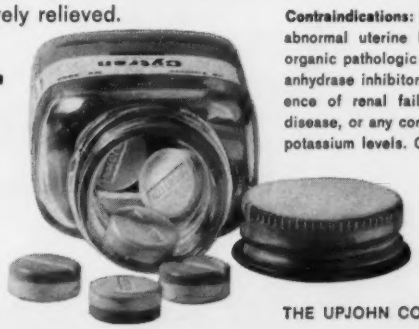

Each tablet contains:

Provera (medroxyprogesterone acetate)	2.5 mg.
Cardrase (ethoxzolamide)	35 mg.
Levanil (ectylurea)	300 mg.

Usual dosage: 1 to 2 tablets daily, 5-10 days before the period.

Supplied: As layered tablets in bottles of 20 and 100.

Precautions: Side effects following the use of Cytran are rare. The patient should be observed for possible sensitivity to one or more of the components. Drowsiness, if seen, may be relieved by decreasing the dosage.

Contraindications: Cytran should not be used in patients with abnormal uterine bleeding until malignancy and all other organic pathologic conditions have been ruled out. Carbonic anhydrase inhibitors should not be administered in the presence of renal failure, hyperchloremic acidosis, Addison's disease, or any condition involving depressed sodium and/or potassium levels. Caution must be observed in the presence of symptomatic hepatic cirrhosis as acidosis may develop. Tranquilizing agents, generally, are not indicated in true depressive states without concomitant anxiety.

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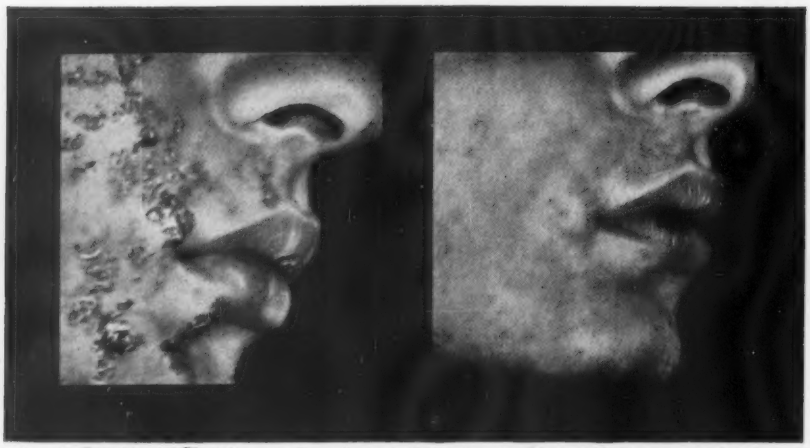

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References: 1. Garber, R. C.: J. Florida M. A. *45*:549 (Nov.) 1958. 2. Lipton, M. I.: Pennsylvania M. J. *64*:60 (Jan.) 1961. 3. Ayd, F. J., Jr.: Psychotropic Drugs, S. Garattini and V. Ghetti, eds., New York, Elsevier Publishing Co., 1957, p. 548. 4. McGettigan, D. L.: West. Med. *1*:8 (Jan.) 1960.

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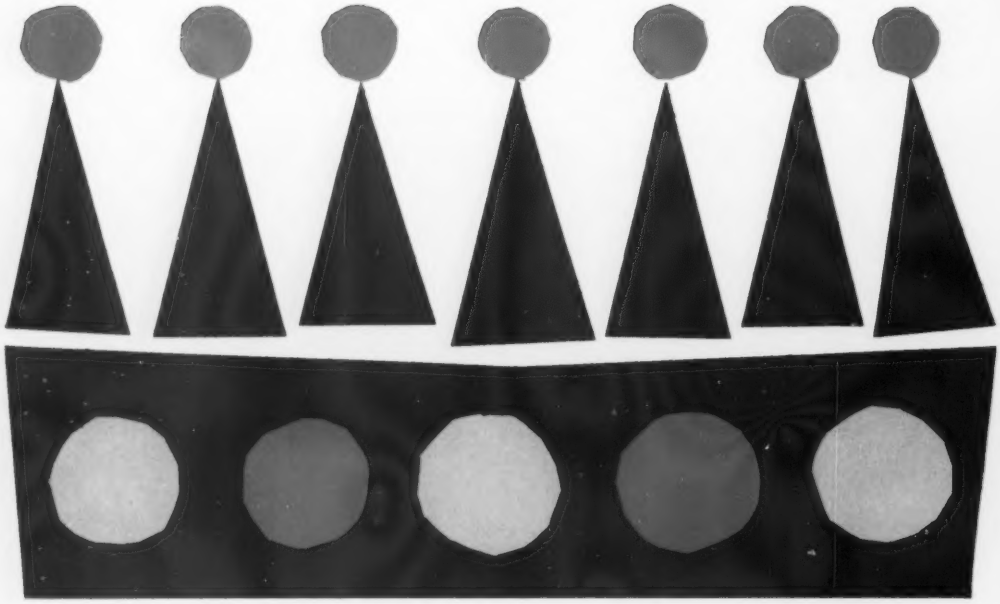

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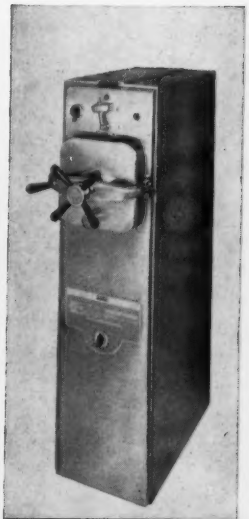

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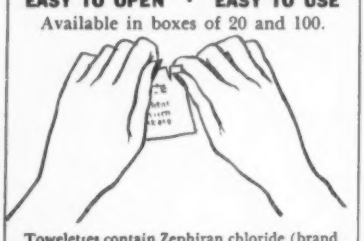

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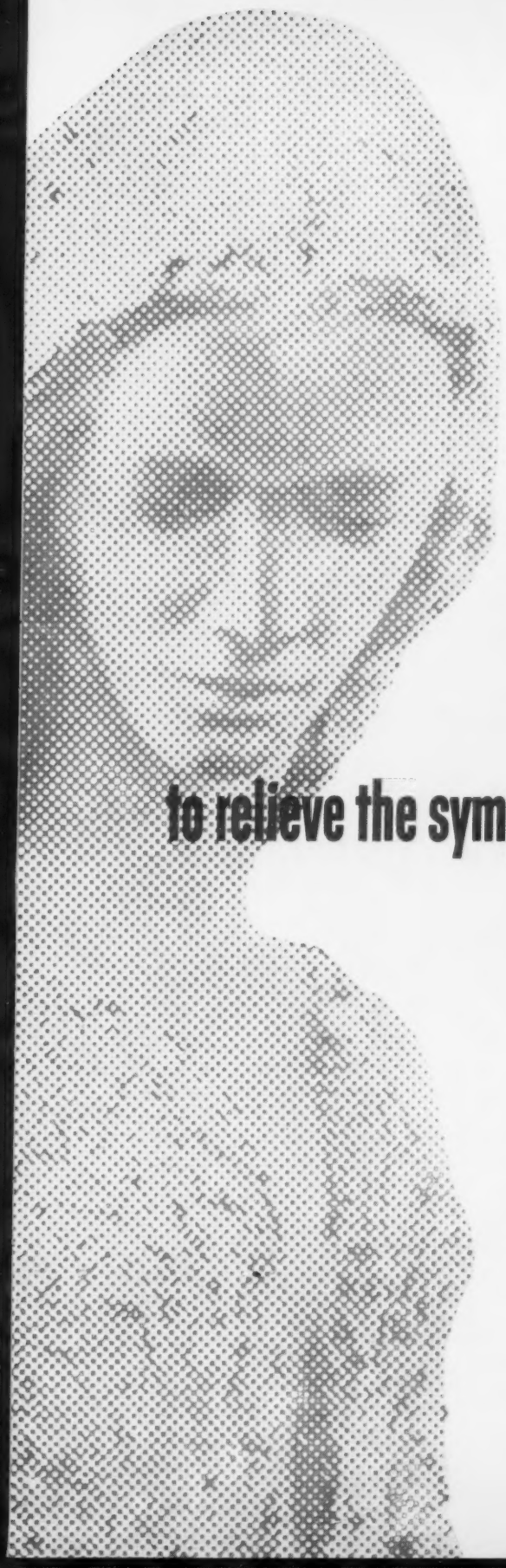

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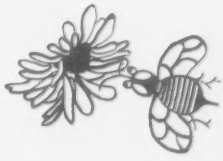
ALLERGY TO STINGING INSECTS

• RICHARD L. ETTER, M.D.
• WARREN J. RAYMER, M.D.
• RICHARD H. JACKSON, M.D.
Houston, Texas

Although allergy to stinging insects comprises only a small percentage of the volume of patients that passes through the offices and clinics of the industrial practitioners, the cases met by these practitioners are medical emergencies. When the physiologic and allergic mechanism of an insect sting is appreciated, a correct diagnosis made and proper treatment instituted, the results are most spectacular. In reviewing the subject of insects it is interesting to note that recognition of severe insect reactions is not new as reported instances date back before Christ.[1] The 11 deaths recorded by the office of the Chief Medical Examiner of the Commonwealth of Virginia from 1951 to 1959[2] include those of a bulldozer operator, a tractor operator, a tool man, and a clerk. We, ourselves, have witnessed severely alarming systemic reactions in railroad engineers and firemen, railroad yard and section workers, oil field and rig workers, linemen, construction workers, refinery workers, chemical plant and yard operators, and an industrial physician.



It goes without saying that a person's occupation has some bearing on his sensitivity; however, those who have employment outdoors and who work in open sheds lead the list of individuals reporting reactions to insect stings. Reactions have been seen in all ages and both sexes.

In dealing with the stings of insects, it is necessary to distinguish between a true allergic reaction and that reaction attributable only to the toxicant injected into the individual. Even a normal person will have a reaction to the toxicant, which is probably an acetylcholine-like substance. Bowen[3] has pointed out that when the honey bee stings, the stinger with the venom sack is retained by the person stung. The bee is then brushed off and dies. It takes a bee two or three minutes to inject the whole amount of venom through its fine stinger. Therefore, the sooner the venom sack is taken off, the less venom will be injected. Hornets, wasps, yellow jackets, and bumble bees have nonbarbed stingers and do not leave their venom sacks. Therefore, they may sting again if they are caught inside a garment.

The following is a partial list of the more important offending insects:

Wasp	Flea	Citrus fruit fly
Bee	Bedbug	Beetle
Ant	House fly	Water flea
Mosquito	Deer fly	Moth
Caddis fly	Locust	Yellow jacket
May fly	Mushroom fly	Mexican kissing bug

To substantiate true sensitization, Bowen[3] showed that some individuals bitten by a mosquito demonstrate a true Arthus phenomenon. We[4] have seen one example of this type in the case of a 48 year old railroad switchman in a local railroad yard. While working, he was stung by a wasp, and within two minutes became short of breath; he then became comatose. The remainder of the railroad crew, believing that he had a heart attack, took him to the railroad

TABLE I.
ACCIDENTAL DEATHS ATTRIBUTED TO INSECT BITES AND STINGS
TEXAS BUREAU OF VITAL STATISTICS

Year	Bee Sting	Wasp Sting	Bee or Wasp Sting	Ant Bite	Spider	Type Unspecified
1952	1	1	0	0		
1953	0	2	1	0		
1954	1	1	0	0		
1955	0	2	0	?		
1958	2	3			1	1
1959*	0	3			0	0

*First 7 months

TABLE II.
ACCIDENTAL DEATHS ATTRIBUTED TO INSECT BITES AND STINGS
UNITED STATES STATISTICS, 1957

State	No.	State	No.
Alabama	3	Missouri	3
California	1	New Jersey	1
Colorado	1	New York	2
Delaware	1	North Carolina	2
Florida	1	Ohio	1
Georgia	4	Tennessee	2
Idaho	1	Texas	10
Illinois	1	Virginia	2
Kentucky	2	Wyoming	1
Louisiana	1		
		Total	40

station and called an ambulance, which took him to the emergency room of a local hospital. By the time he arrived at the hospital, generalized urticaria and swelling had developed. Suspecting an allergic reaction, the medical examiner gave the patient epinephrine. After 30 minutes he responded to therapy enough to say that he had been stung by a wasp. Within 24 hours, a true Arthus phenomenon developed at the site of the insect sting.

Benson[5] divides the types of sensitization into three groups: (1) innocently by scales or dust from wings of body; (2) injection of venom through sting; (3) instillation of salivary secretions.

Bowen[3] states that certain persons fail to react to the bite of a given insect. In others the effect is probably attributable not to secreted irritant, but to an acquired specific sensitization.

Wegelui and Jex-Blake[6] have reported autopsy findings in fatal bee and wasp cases. Their important findings were as follows: edema and emphysema of the lungs, overdistention of the right side of the heart, splanchnic dilation and hepatic engorgement, and petechial hemorrhages of the skin and mucous membrane. The studies of Mann and Bates[2] substantiate this.

Tables I through III illustrate the frequency of accidental deaths attributed to certain insect bites and stings in the states of Texas and Virginia, and the United States. These statistics are by no means exhaustive, as pointed out by Swinny.[7] He has shown that there are many more cases each year than reported, since some deaths from insect stings are recorded as natural, causes unknown.

TABLE III.
DEATHS FROM INSECT BITES IN VIRGINIA, 1951-1959[2]

	Age (yrs.)	Sex	Race	Month	Insect	Survival Time	History of Sensitivity to Insect Bites
1.	55	M	W	July	Wasp	1 hr.	yes
2.	24	F	W	April	Wasp	10 min.	yes
3.	38	F	W	June	Bee	2 min.	yes
4.	31	M	N	Aug.	Yel. jacket?	30 min.	yes
5.	½	F	W	July	Unknown	32 hrs.	no
6.	57	F	W	Sept.	Bee	15 min.	bee-keeper
7.	52	F	W	April	Bee	30 min.	yes
8.	63	M	N	Sept.	Bee	10 min.	yes
9.	2	F	W	June	Unknown	1 hr.	no
10.	37	M	W	July	Yel. jacket	15 min.	yes
11.	49	M	W	Sept.	Wasp	1 hr. 15 min.	yes

From the statistics listed in the report from the Commonwealth of Virginia (Table III) one will note that the survival time in most instances is short, constituting a real medical emergency. An attempt[2] was made to administer antihistamines by mouth in some of these cases, but because of vomiting the drugs were not retained.

Although the incidence of reactions to biting insects cannot accurately be obtained, reports in the lay press of this country have greatly increased. It is because of this that the number of patients who reported to our office has increased fourfold over the previous year. The severe reactions to insects are mainly attributed to the wasp and the honey bee. Severe reactions to other insects can be reported by most physicians. Typical histories of ant bites are enumerated by Bowen.[3] Benson[5] reported several mosquito bite cases. Wolf[8] has reported an unusual allergy to the Mexican kissing bug, and Parsons[9] a case of bedbug bite anaphylaxis misinterpreted as coronary occlusion. The symptoms of patients with histories of sensitivity to wasp, ants, hornets, bees, and mosquitoes vary from severe local reactions to loss of consciousness. Table IV shows the symptoms reported in our own cases, or those of our colleagues.

Common Allergenic Properties of Insects

Increasing interest in insects as causative agents of allergic manifestation, and conflicting reports as to what protection hyposensitization to one member of the Class Insecta affords

TABLE IV.
SYMPTOMS REPORTED IN INSECT STING CASES

1. Local swelling
2. Generalized urticaria
3. Shortness of breath and cough
4. Generalized itching
5. Aching and joint swelling
6. Angioneurotic edema
7. Asthma
8. Nausea
9. Loss of consciousness
10. Headache
11. Convulsion
12. Schoenlein-Henoch syndrome
13. Shock

TABLE V.
RESULTS OF PASSIVE TRANSFER EXHAUSTION STUDIES

	Right Arm	Patient							Left Arm	Patient						
	Substance	KN	JR	MW	SW	NW	GE	WE	Substance	KN	JR	MW	SW	NW	GE	WE
Site 1																
1st day	Serum*								Serum							
3rd day	Wasp**	+	+	++	++	+	++	+	Bee	++	+	++	+	+	+	+
4th day	Wasp	+	+	+	+	−	+	+	Bee	+	+	+	+	+	+	+
5th day	Wasp	−	−	−	−	−	−	−	Bee	−	−	−	−	−	−	−
Site 2																
1st day	Serum*								Serum							
3rd day	Wasp**	+	+	++	++	+	++	+	Bee	+	+	++	+	+	+	+
4th day	Wasp	+	+	+	+	−	+	+	Bee	+	+	++	+	+	+	+
5th day	Bee	−	−	−	+	−	−	−	Wasp	+	+	+	+	+	+	+
Site 3																
1st day	Serum*								Serum							
5th day	Wasp**	+	+	++	++	+	++	+	Bee	+	++	++	+	+	+	+

*0.10 cc.
**0.05 cc.

against the other members of the same class, prompted the present study. Prince and Secrest[10] suggested that the extract of bee will hyposensitize human beings against species of the other families of the suborder Clistogastra of the order Hymenoptera of the Class Insecta, Phylum Arthropoda, whereas Swinny[7] states the sensitivity in species specific.

The close zoological relationship of the wasp (Polistes) and the bee (Aphis mellifica) might suggest common allergenic properties of their antigens. Foubert and Stier[11] have shown in gel diffusion studies that common antigens are indicated. In review of the results of several insect sensitive patients, a common allergen is suggested, since numerous patients state that while they are being treated with the antigen of wasp or bee, ant bites do not bother them.

Our own investigation[12] also suggested common antigens. The sera studied were obtained from unselected patients with clearcut, alarming systemic symptoms from wasp stings. Those whose only reactions were pain, redness, swelling, or exaggerated local swellings were excluded. The sera obtained were injected into individuals who had never had any injections of insect antigen except those used in the skin testing to determine their noninsect sensitivity by punch test. The technique used was as follows:

(1) All studies were done on individuals who were negative to insects by history and skin testing.

(2) Into each of three sites in a vertical row on the lateral aspect of each upper arm was injected 0.10 cc. intradermally of sensitive serum (to which had been added a preservative, 1:100 of its volume of 1:100 Merthiolate,® making the final concentration of Merthiolate 1:10,000).

(3) At the end of 48 hours, the top two sites of the right arm were tested with wasp antigen of 1:100 dilution, and the top two sites of the left arm with bee antigen of 1:100 dilution. These same sites were tested daily on each succeeding day until a positive reaction was no longer obtained by the wasp or bee antigen in the top two sites of each arm.

(4) When the top site revealed a negative reaction (that is, evidence that antibodies were exhausted), site 2 of the right arm was tested with bee antigen and site 2 of the left arm was tested with wasp antigen.

(5) On the last day of the test, site 3 of the right arm was tested with wasp antigen and site 3 of the left arm with bee antigen.

In all donor areas except one the wasp antigen completely exhausted the patient's antibodies,[12] whereas in the sites where bee antigen was used, positive reactions to wasp antigen were not exhausted. In all instances except the one mentioned, the wasp antigen so neutralized the serum sites that bee antigen failed to show any positive reactions and in that site the bee reaction was minimal. Site 3, which had not previously been used as a test site, was used as a control and both showed reactivity on the last day of the test to wasp and bee antigens, respectively. The results are tabulated in Table V.

Method of Treatment

Treatment is divided into two phases: immediate, which may be life saving; and prophylatic, or desensitization therapy.

I. Immediate
   A. Local
      1. Remove barb if present
      2. Moist alkaline packs
      3. Antihistamine ointments
   B. Systemic

TABLE VI.
EXAMPLE OF TREATMENT SCHEDULE IN WHICH TEST WAS POSITIVE IN 1:100,000 DILUTION[4]

1:1,000,000 Twice a Week	1:100,000 Once a Week	1:10,000 Once a Week	1:1,000 Once a Week	1:100 Once a Week
0.05	0.05	0.05	0.05	0.05
0.10	0.10	0.10	0.10	0.10
0.15	0.15	0.15	0.15	0.15
0.20	0.20	0.20	0.20	0.20
0.25	0.25	0.25	0.25	0.25
0.30	0.30	0.30	0.30	0.30
0.35	0.35	0.35	0.35	0.35
0.40	0.40	0.40	0.40	0.40
0.45	0.45	0.45	0.45	0.45*

*Maintenance therapy dosage continued once a month indefinitely.

1. Tourniquet if patient is stung on extremity

2. Epinephrine hydrochloride 1:1,000 solution, 2-3 minims, administered into site of bite, and in some other part of the body, given subcutaneously or intravenously. There is not much reason for giving more than 3 minims in any one site because epinephrine causes enough vasoconstriction that it is not readily absorbed. If the situation warrants, several small injections are more efficient

3. Intravenously administered antihistamine

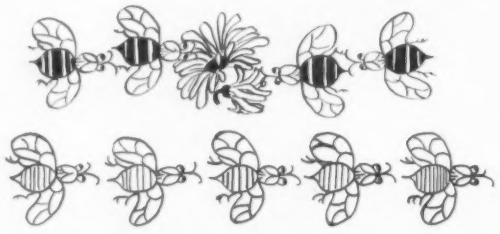
4. Plasma therapy, if there is evidence of hemoconcentration

5. Intravenously administered corticotropic hormones

6. Intravenous aqueous epinephrine 1:1,000, 1 cc. in 500 cc. of isotonic saline; give if in shock

II. Desensitization

A. Species or genus specific antigen is preferable. However, often this is not discernible, especially when the history comes from small children. If a barb is found in the lesion, the sting is almost certainly that of a bee. Often the patient is seen too late to determine what the offending insect was. When this is the case, we give a mixture of bee and wasp antigen even though our previous experiments indicated that wasp antigen will probably protect against bee stings.



The antigen we use[4] is made from whole adult insects that have been caught alive and quick frozen, and kept in that state until the antigen is extracted. Insects that have been dead for any length of time before extracting are not suitable because of change in the protein of the insect. The insects are placed in a Waring blender, with Hollister-Stier extracting fluid, in an amount of one part of insect to 20 parts of extracting fluid. When the mass has been blended well, it is placed in a refrigerator for 48 hours, after which it is sterilized by Seitz filtration. The strength obtained is a 1:20 dilution, called stock. Serial dilutions are then made with Merthiolate® saline dilution fluid. A sterility test is run in thioglycolate broth for 48 hours.

We prefer to make and keep on hand fresh insect antigens. However, for those practitioners who do not have time, or to whom the insects are not available in large enough quantities, commercial extracts or dried defatted insects of some species may be obtained from several commercial houses that prepare allergenic materials.

Testing Insect Sensitive Individuals

A patient with a history of severe insect sensitivity, especially to bee, wasp, ant, or mosquito, is routinely punch tested with material from the following insects:

Wasp	Ant	Small mixed insects
Bee	Roach	
Mosquito	Silkworm	Beetle, Moth

The punch dilution is a 1:20 (weight-by-volume). Insect antigens that give a positive punch test are titrated with genus specific insect antigen in several dilutions, starting with 0.02 cc. of a 1:1,000,000 dilution. If there is no reaction, the 1:100,000 dilution is given, then the 1:10,000 dilution; and, finally, the 1:1,000 dilution. The end point of titration is a local reaction or a systemic reaction, whichever occurs first. Test titrations are limited to three or four per sitting, as cumulative reactions are feared. In addition to the local reactions, the following constitutional reactions have been used as end points: hand itching with nausea, generalized tingling of the skin, asthma, headache, dizziness, and drowsiness. When an end point has been determined, it is used as the starting desensitization dosage. In many of our patients no reaction is obtained if testing is performed too soon after a systemic reaction from a sting or bite. However, testing in these individuals six weeks or more after the reaction has subsided shows a skin reaction.

Desensitization Therapy

When the end point has been determined, treatment is instituted.[4] The end point, determined by titration, is the basis for initial desensitization, and treatment is usually started

in the next weaker dilution than the determined end point. For instance, if a positive reaction was obtained in a 1:100,000 dilution, treatment would be started with the 1:1,000,000 dilution. Hyposensitization dosages are given twice a week for six treatments, then once a week. The usual starting dosage of the determined strength will be 0.15 cc. It is increased to 0.45 cc., at which point the next stronger dilution 1:100,000 is given. This dosage is continued at weekly intervals until a 1:100 dilution is reached, then 0.45 cc. of a 1:100 dilution is given. This dosage is continued at monthly intervals indefinitely.

Comment

According to the Commonwealth of Virginia statistics as interpreted by Mann and Bates,[2] all but one of the nine adults in the series had had previous reactions to insect bites. The one exception, a bee-keeper, had ample opportunity to be already sensitive, by virtue of his continual exposure to bees. The survival time for one child tested was 32 hours. Since this is too long for an insect reaction, one suspects a spider (not an insect). It is possible, however, that this young child had an inborn insect hypersensitivity, with the first sting causing death. The remainder of the cases can be categorized as death due to acute anaphylactic shock.

The rapidity of death in most of these cases precludes emergency treatment by a physician. It would seem imperative that all persons known to be hypersensitive to insect bites receive an adequate course of hyposensitization as a prophylactic measure. Thomas,[13] Swinny,[7] Prince,[10] and our records reflect many cases of sensitive persons who after hyposensitization no longer had severe systemic reactions to subsequent insect bites.

In the early stages of treatment it is advised that patients carry antihistamine on their person to be taken as soon as any suspected insect bite occurs. Bearing in mind that the tablet or capsule might not be retained because of nausea, patients are also instructed to carry and take a sublingual isopropylarterenol (15 mg.) immediately and then report to the nearest physician, hospital, or clinic for further emergency measures.

Summary

Although the problem of insect sensitivity affects only a small portion of industrial patients, those affected are usually emergency cases. Diagnosis is often confusing and the etiology can be even more of a problem. The patient, if carried successfully through the emergency stage, should be told that he can be helped; in fact, it is our obligation to so inform him. This effort on our part may be life saving.

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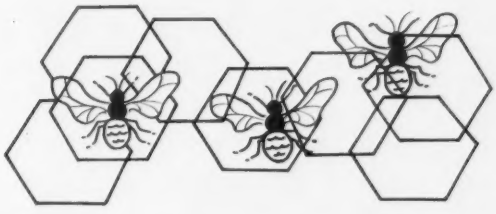

IDENTIFICATION and CONTROL Of Major Industrial Medical Cases

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In any busy industrial medical department, a variety of conditions are seen — from amputations to Zoster. Individually considered, all are important. However, the industrial physician must concentrate on those injuries or illnesses that are of greater significance because of frequent occurrence, severity, excessive time lost from work, or the high cost of treatment and rehabilitation.

In order more readily to identify and follow up these major matters, a new control concept was developed in this corporation which is simple, inexpensive and has proved satisfactory in operation.

A question that arises in devising any medical department statistical procedure concerns the type and extent of information to be maintained. When cases seen in a medical department run into the thousands, ranging from the most minor to the gravest of injuries, it is easily recognized that tabulation of the same data in each case will result either in an overwhelming amount of material to be collected and analyzed, or in-

CHRYSLER CORPORATION — MEDICAL DEPARTMENT

SUMMARY OF MEDICAL VISITS

Name		Plant	Date	Shift	Month to Date	Today	Total
MAJOR CASES* (Initial Visits Only)	Traumatic						
	Non-traumatic						
MINOR CASES (Initial Visits Only)	Traumatic						
	Non-traumatic						
REVISITS	Traumatic						
	Non-traumatic						
EXAMINATIONS	Pre-placement						
	Post-Illness						
	Periodic						
	Other						
GRAND TOTAL VISITS							

* Major Cases include:

1. Cases of alleged occupational injury or illness resulting in time lost from work.
2. Cases referred to outside medical facilities or to Consulting Services Section.
3. Cases receiving major treatment in the Plant Medical Department.
   a. Application of casts or splints which restrict working ability.
   b. Infections following surgical procedures or trauma.
   c. Amputations.
   d. Fatalities.

Cases given permanent placement code change.

			Month to Date	Today	Total
X-RAYS	70 mm.	Other			
PHYSICAL THERAPY					
SPECIAL INTEREST CASES	1				
	2				
	3				

Figure 1

sufficient information made available for analysis of important problems.

Experience has shown that only one to two percent of our cases accounted for the greatest cost and loss of manpower and that these were the problems demanding serious study and action.

We have, therefore, applied our statistical system in two functional parts.

The first part, The Summary of Medical Visits (Figure 1), records all visits to the various Plant Medical Departments by shift. Tabulation is made simply by tally marks, and each day's totals are carried forward to the next day so that a Monthly Summary is automatically produced.

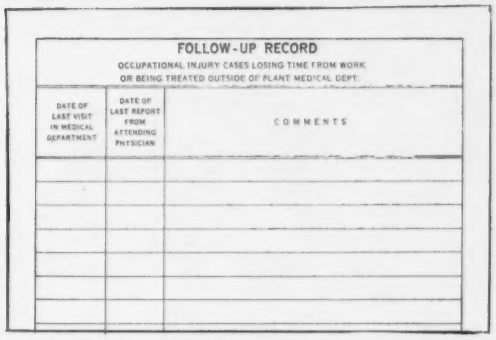
This Summary supplies Medical Administration with information on over-all Medical Department activity and is useful in staff planning, setting up medical programs, and adjusting to fluctuations in plant production schedules.

The second part, The Major Case Report and Follow-Up, was devised to provide additional identifying information and a means of follow-up on those cases that we arbitrarily defined as "Major."

Major cases are occupational injuries that are most costly to the Corporation, and which we believe could be reduced in frequency or magnitude by study and directed effort. Nonoccupational conditions generally are not included for the present, but the system is flexible enough to include them as well as indicated "Special Studies."

The following criteria are used to establish a case as "Major":

1. Cases of alleged occupational injury or illness resulting in time lost from work.
2. Cases of alleged occupational injury or illness referred to outside medical facilities for diagnosis or treatment.
3. Cases receiving specified "major treatment" within the Plant Medical Department even if no time is lost from work.
   (a) Application of casts or splints which restrict working capacity.
   (b) Infections following surgical procedures or trauma.
4. Fatalities.
5. Cases in which there is a permanent restriction in job placement.


FOLLOW-UP RECORD

OCCUPATIONAL INJURY CASES LOSING TIME FROM WORK OR BEING TREATED OUTSIDE OF PLANT MEDICAL DEPT.

DATE OF LAST VISIT IN MEDICAL DEPARTMENT	DATE OF LAST REPORT FROM ATTENDING PHYSICIAN	COMMENTS

Figure 3
Top half of card.

The Major Case Report & Follow-Up Card (Figure 2) is the key tool in implementing the second part of our system. It is a punch card, made in duplicate. One copy is retained at the plant, permitting study of local problems. A second copy, sent to Medical Administration, enables corporate-wide review and analysis. It makes possible effective implementation of the following programs:

1. Accumulation at plant and corporate levels of statistical information concerning major medical problems which require detailed study prior to solution.
2. The evaluation of recurrent conditions, not designated as "major" cases, for a limited time. Note that the Major Case Card can be notched to sort "Special Studies."
3. A convenient method for the Industrial Physician to keep himself informed on the current status and progress of patients losing time or being treated for occupational injury or illness at outside medical facilities. This is done by using the reverse or "Follow-Up" side of the plant copy of the Major Case Report Card (Figure 3).

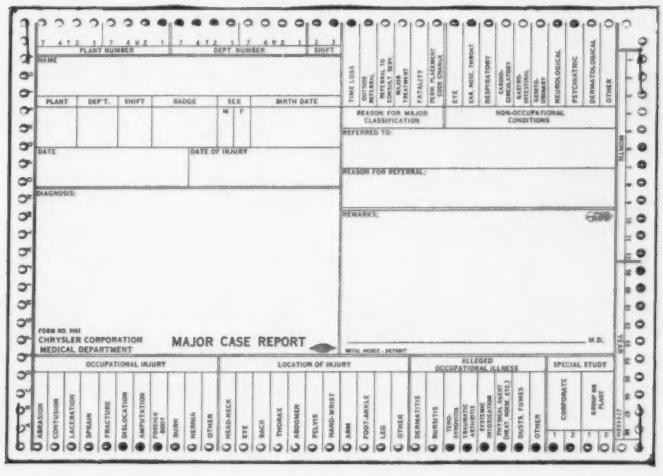


Figure 2

LOCATION:			MONTHLY SUMMARY OF MAJOR MEDICAL CASES	LOCATION:		
MONTH & YEAR:				MONTH & YEAR:		
SHIFT				SHIFT		
1	2	3	REASON FOR MAJOR CLASSIFICATION	1	2	3
			1. Time Loss			
			2. Outside Referral			
			3. Referral to Consulting Services			
			4. Major Treatment			
			5. Fatality			
			6. Permanent Placement Code Change			
			7. TOTAL			
			NON-OCCUPATIONAL CONDITIONS			
			8. Eye			
			9. Ear, Nose, Throat			
			10. Respiratory			
			11. Cardio-Circulatory			
			12. Gastro-Intestinal			
			13. Genito-Urinary			
			14. Neurological			
			15. Psychiatric			
			16. Dermatological			
			17. Other			
			OCCUPATIONAL INJURY			
			18. Abrasion			
			19. Contusion			
			20. Laceration			
			21. Sprain			
			22. Fracture			
			23. Dislocation			
			24. Amputation			
			25. Foreign Body			
			26. Burn			
			27. Hernia			
			28. Other			
			LOCATION OF INJURY			
			29. Head - Neck			
			30. Eye			
			31. Back			
			32. Thorax			
			33. Abdomen			
			34. Pelvis			
			35. Hand - Wrist			
			36. Arm			
			37. Foot - Ankle			
			38. Leg			
			39. Other			
			ALLEGED OCCUPATIONAL ILLNESS			
			40. Dermatitis			
			41. Bursitis			
			42. Teno-Synovitis			
			43. Traumatic Arthritis			
			44. Systemic Intoxication			
			45. Physical Agent (heat, noise, etc.)			
			46. Dusts, Fumes			
			47. Other			
			SPECIAL STUDY			
			48.			
			49.			
			50.			
			51.			

Figure 4

Major Case Report and Follow-Up Procedures

Major Case Report: The medical clerk or nurse prepares a Major Case Card whenever a patient is processed through a Plant Medical Department for a major occupational injury or illness. All information is typed on each card and the appropriate areas on the edge of the card notched. If treatment is completed during the patient's visit, the original copy of the Major Case Card is forwarded to Medical Administration and the duplicate copy is placed in the Plant Medical Department inactive "Major Case" file, sorted alphabetically by year. These are analyzed periodically, at plant and corporate levels, for determination of problems requiring remedial action (Figure 4).

Follow-Up Record: Patients who are referred to outside medical facilities or who are losing time from work should be closely followed up by the Industrial Physician. To accomplish this effectively, the follow-up side of the Major Case Card (Figure 3) is employed.

In these cases, the plant copy of the Major Case Card is retained in the active case follow-up file on the physician's desk until the case is closed. At that time the card is placed in the inactive file.

The Industrial Physician transcribes onto the "Follow-Up Record" any pertinent comment concerning the patient's progress. He reviews this file periodically to determine whether the information is current and adequate. If not, he may:

1. Request written supplementary reports from the hospital or consultant.
2. Communicate with the attending physician.
3. Summon the patient to the Plant Medical Department for examination.
4. Visit the patient at the outside medical facility.

Summary

The authors have developed a control concept for the Chrysler Corporation Medical Department which fulfills a three-fold need: (1) a simple system of obtaining current information on over-all Medical Department activity and needs; (2) a means of detection and study of cases which present major elements of time-loss, disability, and high cost, and (3) an efficient method by which the Industrial Physician can keep posted on the progress of those patients who are beyond his direct control because of absence from work, or treatment in outside facilities.

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MICROWAVE RADIATION OF 10 mw/cm

And Factors that Influence Biological Effects At Various Power Densities

In 1953, Schwan recommended that microwave radiation of 10 mw/cm^2 be accepted as a tolerance dose. This suggestion was made in a memorandum submitted to the Office of Naval Research following a conference at the Naval Medical Research Institute in Bethesda, Md. We quote:

> A tolerance dosage of 0.1 Watt/cm^2 absorbed energy was suggested for discussion. We consider this suggestion too high to be recommended. Our arguments may be advanced as follows: (a) Assuming a caloric intake of about 3000 Kcal per day for a normal human being at light work, we count on about 100 Kcal per hour dissipated heat. This takes into account that the coefficient of effectiveness of the human body is not very high and in the range of about 30% at best. This heat dissipation is due in part to evaporation of water, heat convection, and heat radiation when the body is substantially warmer than the surrounding medium. At temperatures above 37°C, evaporation is obviously the only possibility for freeing the body of the 100 Kcal per hour or 100 Watts. For the total body, 100 Watts provides a reasonable value for discussion of tolerance dosage. If we assume the total body surface to be about 2m^2, 0.005 Watt/cm^2 characterizes the heat production. A UHF-radiation intensity of 0.1 Watt/cm^2 supplies per cm^2 irradiated area 20 times as much energy as the body sets free under normal circumstances. It appears that the suggested figure cannot be regarded as a safe tolerance dosage. A more conservative figure seems to be 0.01 Watt/cm^2. [1]

That this dose was accepted by the U. S. Air Force becomes apparent from a presentation of Col. George M. Knauf (MC) U.S.A.F., before the Section on Preventive Medicine at the 106th Annual Meeting of the American Medical Association (June 7, 1957), and which reads in part as follows:

> About two years ago we at the Rome Air Development Center reviewed the research which had been accomplished up to that point on the biological effects of microwave radiation and arrived generally at the following conclusions: A power density of approximately 0.2 w/cm^2 seemed to be the point at which a division between effect and no effect could be predicted. A careful review of the manner in which the experiments were conducted, animals exposed, and instrumentation accomplished led us to believe that in all probability the animals involved had been subjected to more energy than the reports indicated. This led to the belief that the reported figure of 0.2 w/cm^2 constituted a conservative estimate and a level which could be accepted as the level below which one might reasonably anticipate no appreciable biological effects. We felt that, with the uncertainty which surrounded the instrumentation used, it would probably be wise to build into our thinking a factor of safety. Hence we published a maximum safe exposure level of 0.01 w/cm^2. This was disseminated to interested commands and agencies as being the level at which we would fix the maximum permissible ambient energy level. This appeared to be a safe and reasonable level and one which could be maintained in the laboratory.[2]

This dose (0.01 w/cm^2) was subsequently recognized by NATO and by the USSR.[3]

Recently, observations were made demonstrating certain factors or conditions which influence considerably the survival time of experimental

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animals exposed to various doses of microwave radiation. It is believed that these factors will have a similar influence on what may be considered or accepted as a safe dose of microwave radiation for man, namely: the frequency or wave length, time (period of exposure), the rate of the irradiation cycle or the "irradiation cycle rate," air currents, the environmental temperature, body weight of an individual, and the position of an individual in influencing resonant conditions and standing waves, differences in the sensitivity of organs and tissues, and the effect of reflections.

Each factor will be considered briefly and highlighted by an example.

Frequency of Wave Length

At low frequencies (when considering microwaves, that is below 200 megacycles or a wave length of 1.5 meters) "bulk" absorption is of a low degree and the tissues of the body are acting as a relatively transparent dielectric medium with the probable cause for excessive currents (and heating) directly referred to the geometry and spatial distribution of the body and the presence of high field intensities.

From medium high to very high frequencies, absorption of microwave energy (and heat) increases with an increase in frequency. Maximum absorption occurs at a frequency of 24.5 Kmc or a wave length of 1.225 cm.[4] This results from the mechanical excitation of the polar water molecule by the electromagnetic waves.[4]

The depth of penetration of microwave energy decreases with this increase in bulk absorption. One might say that the tissues of the body behave between the limits of transparency and opacity. Between these extremes, certain other phenomena come into interplay. These have been demonstrated by a vast number of experiments and mathematical investigations conducted by H. P. Schwan.[5] Briefly, these effects are related to differences in dielectric properties between the various tissues and tissue interfaces in the body. Due to these differences, it is possible to calculate, predict and show by experiment the wide variations in absorption that exist for individual wave lengths.

Interface boundaries between various tissues may cause interferences such as reflections and "standing waves." Because of these interferences, "hot spots" may be produced in which field strengths and current densities are actually greater than those in the incident microwave field irradiating the surface layers of the body. "Hot spots" can be the site of injury from irradiation in the field strength which produces no noticeable effects in surrounding tissues.[5]

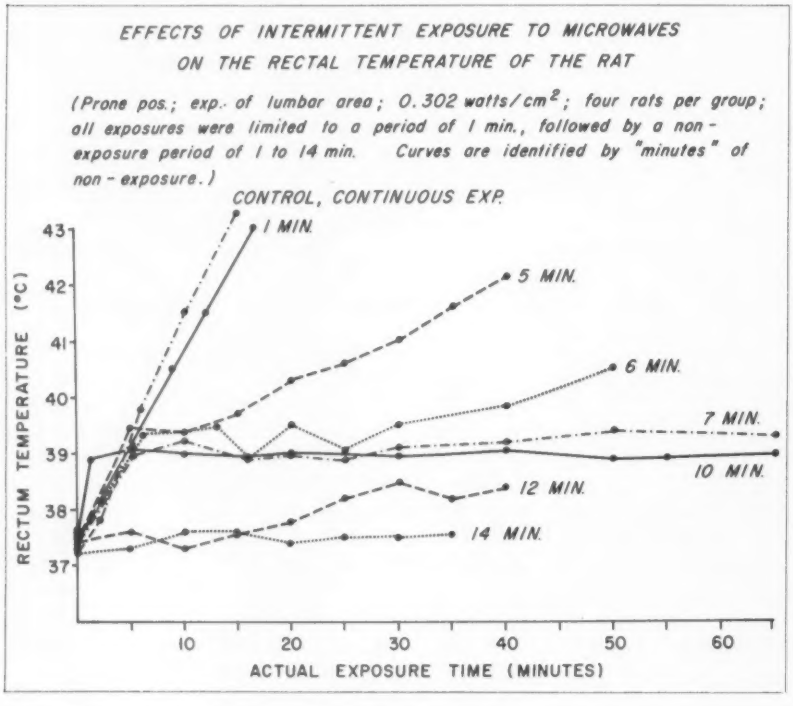

Figure 1
(Reproduced from J. of Occup. Med. 1:369, 1959).

In addition to interface (interbody) standing waves, the outer surfaces of a body or body cavity may, because of their physical dimensions and dielectric properties, act in conjunction with the body tissues in causing a quasiresonant or focusing effect. In certain areas of the body, this may result in the production of a high concentration of microwave energy, thereby inducing specific effects or even localized injury.[5]

It is possible and conceivable that specific conditions could exist wherein the outer tissues of a body or the layers of the skin could, because of dielectric characteristics, act as a "match-

ing transformer section" for certain frequencies in the microwave spectrum. Should this occur, it will result in a much greater absorption from an incident wave front than that which would normally be expected from calculations involving the reflection and absorption coefficients of the body surface.

Time

The period of microwave exposure as measured in hours, minutes or seconds, will obviously influence the effects of radiation, may they be local or systemic. In the following example the time interval of microwave exposure (wave length 1.25 cm, 302 mw/cm^2) was related to the rate of rectal temperature rise and survival time of rats (Figure 1). Uninterrupted exposure was followed by an immediate rise of rectal temperature from 37.2°C to over 43°C, and to the death of all animals in a mean of 15.5 minutes. Exposure for one minute, followed by a nonexposure period of one minute (sequence repeated until death), killed the rats after 16.5 minutes of *actual* exposure. As may be expected from the period of survival, the rectal temperatures rose almost as acutely as they did in the animals exposed continuously. One minute of exposure every six minutes raised the period of survival to about 34 minutes of *actual* exposure. Only when the exposure dropped to one minute every 14 minutes, did the rectal temperatures of the animals fail to rise. In the animals exposed one minute every five, six, seven or 10 minutes, respectively, there occurred during the first five minutes of exposure an acute rise in rectal temperature of about 2°C. From this moment on, a further rise in temperature decreased from a gradual rise to no rise, as the exposure decreased to one minute every 10 minutes. It becomes evident that the rat is able to readjust its body temperature to a higher level, maintaining it at this elevated level as long as the radiation exposure does not exceed certain limits.

"Irradiation Cycle Rate"*

We are introducing this term referring to "the number, or the rate, at which ON-OFF periods of irradiation are repeated per unit of time." This factor (one might refer to it also as a second duty cycle) was found to influence significantly the effects in the field irradiated. Preliminary data that referred to this phenomenon were presented at the Microwave Investigators Conference in 1958.[6] A formal report was rendered at the Third Tri-Service Conference in Berkeley, California, in 1959.[7] The data (wave length: 1.25 cm) showed that the briefer the individual bursts or periods of exposure and nonexposure, the less were the local and systemic effects in experimental animals, *even though the total dose of irradiation per unit of time was the same* (in our experiments, one minute). The obviousness of this phenomenon was demonstrated at the 1959 meeting by one of us (WBD), by passing a finger, at various rates, through the flame of a lighted candle. The significance of these observations becomes obvious when considering, for instance, two radars, one rotating at 6 rpm, the other at 12 rpm. If wave length and w/cm^2 of these two units are identical, then effects (if any) should be expected first in personnel exposed to the slower rotating equipment.

(In the studies concerning intermittent exposures at various "Irradiation Cycle Rates," the turning on and off of the microwave generating equipment was accomplished by keying on and off the alternating current supplied to the modulator high voltage power transformer. Any time delay introduced by the build-up of voltage in this power supply was found to be insignificant. On one occasion, a defective magnetron was found incapable of being operated in this manner and it was discarded [Figure 2] [Table I].)

The underlying causes of the phenomenon of injury are complex. The following factors must be considered if an analysis is desired: (a) energy incident, (b) energy absorbed (related

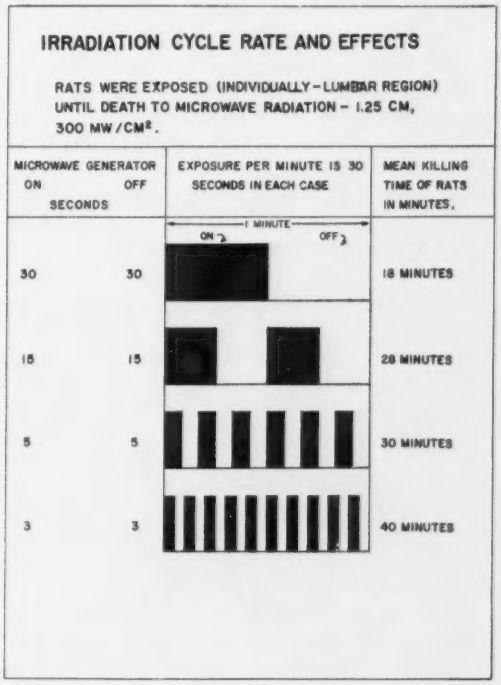

Figure 2

*This terminology was suggested by J. M. Eubanks, formerly on the faculty of the University of Miami, Coral Gables, Florida.

TABLE I

INTERMITTENT EXPOSURE OF RATS TO MICROWAVE RADIATION

(All rats were immobilized in a Plexiglas and Saran screen holder; exposure of 300 mw/cm^2-wave length; 1.25 cm was directed to the lumbar region; weights of rats; Expts. 1 to 5: 250 ± 20 g, weights of rats of Expts. 6 and 7: 250 ± 14 g. Reproduced in part from Deichmann, Keplinger, and Bernal.[7])

No. of Expt.	No. of Rats per Group	Period of Time (seconds) Transmitter was "ON"	"OFF"	Ratio of Exposure to Non-exposure	Mean Time Transmitter was "ON" or Mean Lethal Exposure Time* minutes
1	4	60	60	1:1	16
	4	30	30	1:1	18
	4	15	15	1:1	28
	4	5	5	1:1	28
	4	3	3	1:1	40
2	4	30	60	1:2	39
	4	15	30	1:2	54
	4	10	20	1:2	65
	4	5	10	1:2	82
	4	3	6	1:2	95
3	4	60	180	1:3	28
	4	30	90	1:3	51
	4	15	45	1:3	55
	4	10	30	1:3	76
	4	5	15	1:3	100 (2 survived 100 min.)
	4	3	9	1:3	110 (2 survived 110 min.)
	4	1	3	1:3	118 (3 survived 118 min.)
4	4	30	120	1:4	70
	4	25	100	1:4	85 (3 survived 100 min.)
	4	20	80	1:4	all survived 100 min.
	4	15	60	1:4	all survived 100 min.
5	6	45	225	1:5	69 (5 survived 80 min.)
	6	30	150	1:5	all survived 80 min.
	6	15	75	1:5	all survived 80 min.
	6	10	50	1:5	all survived 80 min.
6	11	60	60	1:1	18
	10	3	3	1:1	36
7	10	60	120	1:2	35
	10	3	6	1:2	87

*Refers to *actual* exposure.

to the absorption coefficient and to the electrical characteristics of the tissues involved), (c) specific heat (the number of calories required to raise the temperature of a given substance to a given extent, usually 1°C) of the tissues involved, (d) time of exposure (the length of an exposure in minutes or seconds and the relation to the length of "no" exposure, (e) rate and mechanism or mechanisms of heat dissipation, and (f) critical temperature for injury. Of these factors, (a) and (b) are obviously important variables. The rate of temperature rise is related in part to (b) and (c) and varies for different tissues and wave lengths as well as for a given power density. In a continuous exposure, the time elapsed before some injury occurs depends at least upon three factors. If the rate of temperature rise is not offset by heat dissipation before the "critical" temperature is reached, then damage of the tissue exposed, or to other areas indirectly involved, will result.

When a cyclical exposure is experienced and if the "ON" period of exposure does not reach or exceed the time necessary to induce the critical temperature, then the "OFF" period allows a partial or complete return to the normal or pre-experimental temperature via the mechanisms of heat dissipation. Also, one must give consideration to some biological complications. These might result in "fatigue" of the heat dissipating mechanism, result in cumulative effects of injury and lead eventually to a breakdown of the defense mechanism. For example, in a case where a good portion of the heat dissipation is dependent upon normal blood flow, impairment of the circulatory system would certainly lead to injury or even to death.

Air Currents

To demonstrate the significance of air motion in increasing the loss of body heat and in retarding the appearance of local burn or death, each of a group of immobilized rats was exposed in the prone position to 250 mw/cm^2 of radiation of 1.25 cm wave length. During the exposure, some of the animals were subjected to an air current of approximately 16 miles per hour (Table II). The air currents dramatically increased the period of survival of the rats, from a mean of 47 minutes to 18.5 hours. Moreover, the control group, animals immobilized and exposed to air current but not to radiation, died earlier, that is in 16 hours, and with rectal temperatures approximately 10°C lower. In other words, radar exposure retarded the onset of

TABLE II

EFFECT OF AN AIR CURRENT OF 16 MILES/HOUR ON THE SURVIVAL OF RATS CONTINUOUSLY EXPOSED UNTIL DEATH TO 250 MW/CM^2

(Immobilized rats were exposed individually in the prone position; exposure was directed to the lumbar area; wave length: 1.25 cm. The means were calculated from data presented by Deichmann, Bernal and Keplinger.[8])

No. of Rats Exposed	Experimental Conditions	Mean Period of Survival	Lowest and Highest Rectal Temperatures at Death
10	Room Temp. 15°C Exposed to 250 mw/cm^2 Still Air	47 minutes (36 to 63 min.)	43.3 and 45.2°C
10	Room Temp. 15°C Exposed to 250 mw/cm^2 Air Current of 16 Miles/hour	18.5 hours (8 to 24 hrs.)	24 and 30°C
10	Room Temp. 15°C No Exposure Air Current of 16 Miles/hour	16 hours (12 to 21 hrs.)	14.5 and 16°C

death which was initiated in both groups by cooling and immobilization (Figure 3).

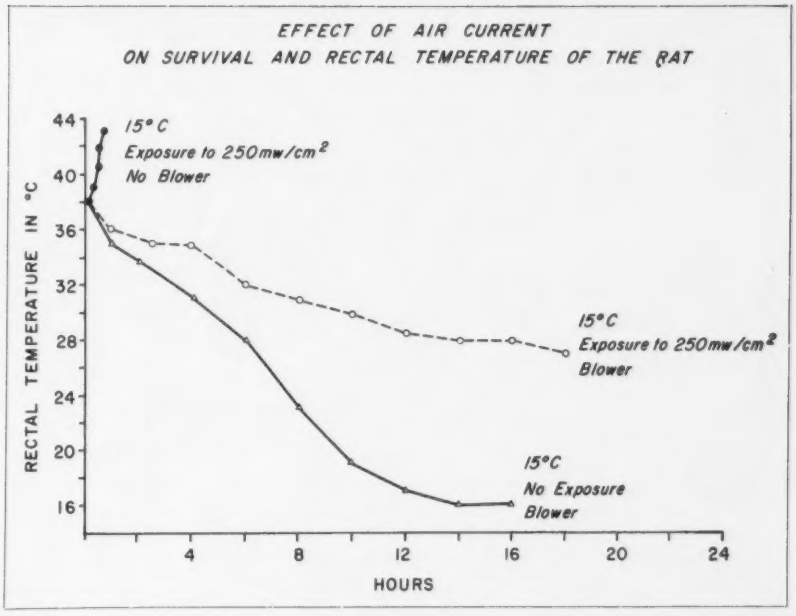

Figure 3
(Reproduced from this journal, 28:535, 1959.)

Environmental Temperature

It has been known for some time that microwave radiation is capable of raising the local and/or the systemic temperature of an animal. It has also been known that experimental radiation effects are more marked in the "hot" room than at room temperature, but systematic studies relating environmental temperatures to microwave effects have apparently not been reported before 1959.[8]

Table III demonstrates that experimental radiation effects induced by a magnetron generating a wave length of 1.25 cm (250 mw/cm^2) are significantly influenced by the environmental temperature. As may be expected, the cooler the room temperature (within the limits investigated) the less severe were the local and the systemic effects. Rats exposed at 35°C (93°F) survived 17.4 minutes; those exposed similarly at 15°C (59°F) survived for 47 minutes (Figure 4).

Body Weight or Type or Mass Versus the Exposed Area

Generally, the body of an animal will absorb microwave energy in direct proportion to its surface area (or in proportion to the area exposed). It is the small animal which has the larger body area in proportion to its mass. From this follows, that when the absorbed energy is transformed into heat, and when this is distributed by means of the circulation, the temperature rise will be greater in a small animal than in a large one, but after exposure it will drop more rapidly. This reasoning is based upon the concept of bulk absorption from a plane wave front. For the moment, no corrections are considered for "transparency" or for different absorption coefficients.

During the course of our studies (wave length 1.25 cm) it was learned that in order to obtain consistent results, body weights must be controlled to a definite degree. At present, rats are selected weighing ± 7g of a particular weight, usually 150 g. The importance of using litter mates for chronic experimentation becomes particularly obvious when large animals are used.

It seems reasonable to expect a certain spectrum of effects in man caused by differences in body types. Because of differences in absorbing areas, a short, stocky Eskimo might absorb less radiation than a tall, thin African of the same body weight. On the other hand, his body, because of the greater fat content, will experience a greater rise in temperature with the same heat absorption. The higher the fat content, the greater the depth of penetration of microwaves, or in other words, fatty tissues are more transparent to microwave energy than tissues containing a

TABLE III

EFFECT OF ENVIRONMENTAL TEMPERATURE ON THE SURVIVAL OF RATS EXPOSED CONTINUOUSLY UNTIL DEATH TO MICROWAVE RADIATION OF 250 MW/CM^2 (There were 10 rats per group; each animal was exposed individually, dorsal exposure; wave length: 1.25 cm. Reproduced in part from paper published by Deichmann, Bernal and Keplinger.[8])

Temperature in Exposure Chamber (± 0.5 to 1°C)	Mean Period of Survival
35°C (93°F)	17.4 minutes
30°C (86°F)	21.0 minutes
25°C (77°F)	26.8 minutes
20°C (68°F)	36.3 minutes
15°C (59°F)	47.0 minutes

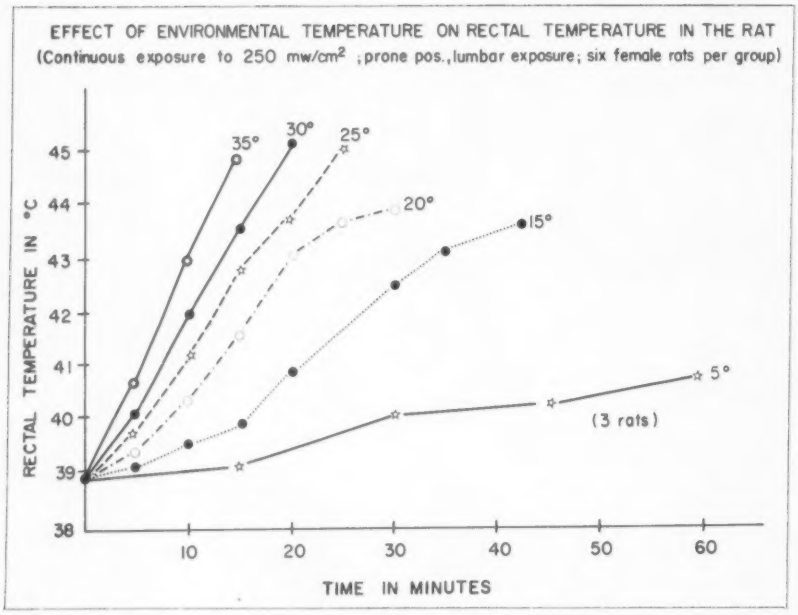

Figure 4
(Reproduced from this journal, 28:535, 1959.)

higher water content. Yet, beyond the fatty tissues, absorption does occur in the tissues with the higher water content. Heat dissipation, however, is reduced by the insulating fatty tissues (Figure 5). Absorption of energy may be further increased through the production of standing waves brought about because of the fatty tissues and their interfaces at other tissues or media (Figure 6). It is for these reasons that a unit dose of microwave radiation induces a higher temperature in a body covered by a layer of fat.

Coming back to the tall, thin African, he can be expected to be better suited to the task of dissipating the excess body heat he might experience from the absorption of microwave energy. But, if we were to include the factors of environmental temperature and possible gale winds, the Eskimo in his natural habitat would certainly have the advantage. As is readily seen, there exists a paradox complicated by a number of variables that may have to be considered and defined concerning a particular individual in question. Therefore, besides body weight, body tissues, and clothing the body surface area is important, not only in the rate of absorption of microwave energy, but also in the dissipation of excess heat induced by it.

Orientation or Position of an Individual, Influencing Resonant Conditions and Standing Waves

Under certain conditions, the geometry or position of an exposed individual may greatly affect his welfare in a microwave field. It has been shown that a cylindrical conductor, when placed in an electromagnetic field, will abstract the most energy from this field when its long axis is parallel to the electrostatic component of the field. It has also been shown that branches of a complex shape such as fingers, arms or legs may also act in a like manner. Of course, the greatest amount of energy is abstracted when the member in question is a certain fraction of a particular wave length.

Under the conditions mentioned above, the exposed member acts as a resonant antenna or

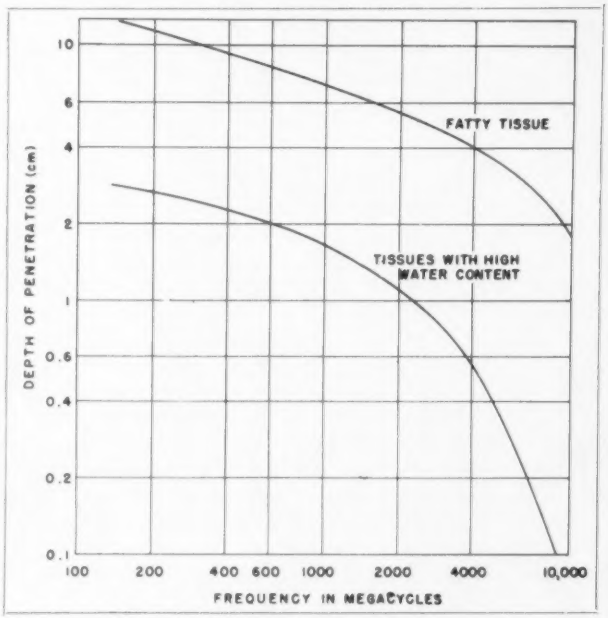

Figure 5
This figure was supplied through the courtesy of Dr. Herman P. Schwan, University of Pennsylvania.

absorber which supports standing waves. These standing waves are nodal and antinodal points of current and voltage and may result, at definite points, in extremely high currents as well as in localized heating.

For example, if an outstretched arm parallel to the electrostatic component were resonant and (for the simple case) in length equal to one quarter wave length, the greatest current would appear where it joined the body. If this arm were then rotated 90° in the plane of radiation, the current picked up by it would be at a minimum and hardly noticed.

If a man were standing upright on a wire mesh airstrip and if he were exposed to a high intensity vertically polarized (electrostatic plane vertical) electromagnetic wave front, and if he were a quarter wave length in height (39 megacycles), he would experience a comparatively high current density (and subsequent heating) in his ankles. This could harm him. If he were to sit down or crawl upon his hands and knees, he would probably not notice an effect.

These are examples of resonant conditions which may exist in an exposed subject because of his physical dimensions and orientation. For this reason, all animal experiments are conducted in our laboratory with the experimental animal's position controlled and recorded. In the rat, particular susceptibility has been noted in the animal's ears, which seem to be near a resonant length at 24 Kmc (wave length: 1.25 cm).

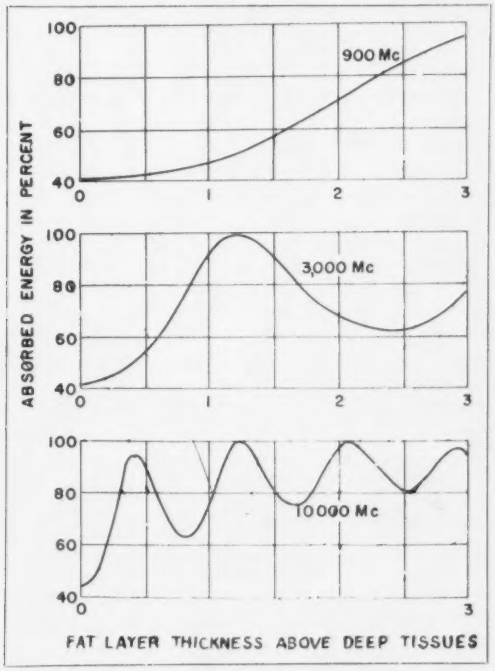

Figure 6
This figure was supplied through the courtesy of Dr. Herman P. Schwan, University of Pennsylvania.

TABLE IV
CONTINUOUS EXPOSURE UNTIL DEATH OF MICROWAVE RADIATION TO THREE AREAS OF THE BODY OF THE RAT
(There were 20 rats per group. Exposed areas were kept constant and equal to the size of a rat's head; wave length: 1.25 cm; power density: 300 mw/cm². Reproduced from paper published by Deichmann, Stephens, Keplinger and Lampe.[9])

Area Exposed	Mean Time Required to Kill
Head	18.5 minutes
Lumbar Region	15.5 minutes
Abdomen	12.3 minutes

Differences in Sensitivity of Organs and Tissues

Practical experience has demonstrated that a comparatively avascular organ or tissue is relatively prone to microwave damage. This may be said for the lens of the eye in which cataracts have been produced. Testicular damage has been claimed, but this is more difficult to prove or to disprove. The more sensitive organs also include the hollow viscera, particularly sections of the gastroenteric tract.

It is known from animal experimentation that total body exposure will induce temperature gradients in different organs and tissues. Table IV presents such data. When exposure to the head, lumber region and abdomen were compared, keeping the diameter of the exposed areas and other conditions constant (wave length 1.25 cm, 300 mw/cm²), it was found that rats die most rapidly, in 12 minutes, when the abdominal area was irradiated. It took about 15 minutes to kill with the exposure directed to the lumbar region. The head was least sensitive, requiring about 18 minutes to produce fatalities. (These experiments did not concern themselves with the extent of internal damage.)

Effect of Reflections

One other condition that should be mentioned is the possibility of suffering an increased exposure of reflections in a complex environment. This factor could become quite important. Because of the ability of microwaves to be readily reflected from many types of surfaces, the possibility exists of encountering a high concentration of microwave energy at some unsuspected point. This may become of particular importance in close quarters, as for instance aboard ship, as well as in areas where several radars are operating.

Summary

1. In 1953, Schwan recommended that microwave radiation of 10 mw/cm² be accepted as a tolerance dose. In 1956, the U. S. Air Force

disseminated this level to interested agencies.

2. Experimental microwave studies have demonstrated that a number of factors must be closely controlled in order to obtain reproducible results with experimental animals. These same factors can be expected to modify significantly what may be considered, under certain conditions, a safe exposure level. They include: (a) the *frequency* or wave length of the generating equipment, (b) the period of *time* of exposure in hours, minutes, or seconds, (c) the *irradiation cycle rate*, referring to the individual ON-OFF periods during a unit time interval (a minute), *when total time of irradiation per minute is kept constant*, (d) *air currents*, (e) *environmental temperature*, (f) *body weight, type* or *mass*, and *covering* in relation to the exposed *area*, (g) *orientation or position* of an individual influencing resonant conditions and standing waves, (h) *differences in sensitivity* of organs and tissues, and (i) effect of *reflections*.

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Watch Your Blood Pressure

Standard blood pressure measurements taken in the arm are of limited clinical significance, according to Sidney Roston, M.D. of the University of Louisville School of Medicine. Doctor Roston's remarks were addressed to the three day conference held in May in New York City on Mathematical Theories of Biological Phenomena, that was sponsored jointly by the New York Academy of Sciences and the Committee on Mathematical Biology at the University of Chicago.

Mathematical analysis of the cardiovascular system reveals that blood pressure in the arm is completely independent of blood pressure in the aorta, the major vascular trunk from which the entire arterial system radiates, Dr. Roston said. This conclusion is based on the results of work on a "mathematical model" of the heart great vessels and general vasculature, in which a series of mathematical equations give an indication of heart activity. The present model characterizes a two-chambered cardiovascular system.

Pressure at critical organs of the body — the heart itself, brain, kidney — is a much more important indicator, Dr. Roston explained. One clinical reason for the inaccuracy of brachial blood pressure readings lies in the fact that the carotid and femoral arteries may narrow as a result of arteriosclerosis for instance, so that arterial pressure may then be dangeously low in the brain or legs, while pressure in the arm is unchanged or even high.

Another finding of Dr. Roston's work suggests that the aorta may protect the heart by acting "in a sense as a second heart," to reduce the energy drain on it. During systole, when the heart contracts, blood is forced into the ascending aorta and stored there. Then, during diastole, when the heart expands, the elastic walls of the ascending aorta contract and pass the blood through to the descending aorta. Dr. Roston's model allows the mathematical deduction that the greater the elasticity of the walls of the ascendng aorta, and the lower the pressure there the less force the heart must exert.

Factors Leading to Chronicity Of Acute Occupational Dermatoses

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Introduction

Occupational diseases of the skin may be classified into five major groups: acute eczema, chronic eczema, acneform eruptions and folliculitis, pigmentary disorders, and carcinoma.[1] In a broad sense, discussion of those factors leading to chronicity of acute occupational diseases involves all the categories mentioned. But because of the fact that about 90% of all occupational diseases fall into the group of contact dermatitis,[2] our discussion will point mainly to that group of diseases, namely, those produced by primary chemical irritation (80%) or by true contact allergy (20%).[2] Because of the marked expense involved in this group of diseases, it would be well to acquaint all physicians who see and treat occupational skin disease with those factors that prevent the useful return to work of people who, once plagued with a contact dermatitis, are loathe to return because of the continuation of the process, or aggravation of it, once started. It is to these ends that our efforts are guided.

Failure to Eliminate Allergen or Irritant

This category probably represents one of the greatest causes of chronicity. It stems from failure to make a correct diagnosis or failure to make any diagnosis. If, indeed, any disease be treated with effectiveness, regularly, the factors leading to the occurrence of the disease must be known. These factors once known should be eliminated, if possible. In industrial dermatoses, one has a unique opportunity to separate the diseased person from the factors associated with the cause of the disease. Where no diagnosis is made or where no effort is put forth to elucidate the nature and cause of the disease, the method of treatment is not clear. What follows is a haphazard course of therapy that is usually associated with remissions and exacerbations of the disease. The situation becomes confused and the eczema, chronic.

When the cause is sought, it frequently is discovered, particularly in industrial disease where the contact environment is limited. The cause may be proved by means of patch testing,[3] for true allergens or insidious primary irritants, or by withdrawal from the job temporarily and then re-exposure in the case of primary irritants. The cause is eliminated by avoidance or protection, and the eczema clears with or without treatment.

Overtreatment

A physician or nurse treating a rash without seeking a cause is like two well informed individuals playing tick-tack-toe. There is no point in playing the game since the conclusion, which is always a draw, is known.[4] It is an impression of many physicians that the more fortuitous the treatment, the more common is the occurrence of a supervening contact dermatitis. What is needed is a method of approach in determining the cause and then a method of approach in treatment. Acute contact dermatitis is a self-limited disease provided the cause is eliminated. The use of proper medication usually hastens recovery. The use of bland compresses followed by bland lubricants is suggested and the details may be found in any good textbook of dermatology. Certain of the more extensive eruptions are well treated with the steroids, but this merely hastens involution. What then is meant by overtreatment and its importance?[5] Eczemas

are primarily overtreated by the improper use of specific drugs, most frequently the use of topical anesthetics, antihistamines and certain antibiotics. In this situation the patient usually has been given a variety of medications to use in a haphazard manner, and takes the notion that he may as well be a therapist too. He consults friends, some druggists, and other local therapists and soon is able to open a pharmacy of his own. Eventually the patient's skin is either irritated by a medicament or he has become allergic to one of the many remedies he has been using.

Failure to Eliminate Secondary Aggravating Factors

Once the removal of the causative agent of a dermatitis has been effected, certain other factors may come into play which it will be well to enumerate and treat if possible. In some cases improvement of the secondary factors will not be possible. In this event we will at least be aware of their existence and will be able to understand the progress or lack of it in some patients. These factors are:

1. Secondary bacterial infection
2. Pre-existing mycotic infection
3. Dyshidrosis
4. Pre-existing dermatoses or diathesis
5. Improper cleaning facilities
6. Systemic disease

Secondary bacterial infection[6] is present almost invariably in an acute eczema and frequently in a chronic eczema. The means to determine the presence of bacteria are available readily. These are culture and smear. A smear is helpful to determine whether a bacteria is a true pathogen or has merely colonized the area involved, in the former case both bacteria and polymorphonuclear leukocytes being present.

A chronic superimposed bacterial infection will often add a synergistic effect to the already present eczema and will aid in continuing the process unless appropriate antibacterial measures are taken.

Mycotic infections[7] with various of the superficial fungi are so common their presence would be of no surprise in a large number of industrial workers and in some of those who suffer from an occupational dermatitis. In this case, a dermatophytosis may be responsible for chronicity by two means. It may provide actual infection of the involved area or it may provide the site of a locus minoris resistentiae, a site of former or impending id reaction. It would be well, then, to treat any mycotic infection present to limit the possibilities of chronicity from this source.

Dyshidrosis is a recurrent, noninflammatory vesicular eruption of the palms and soles.[8] Although it is probably not a true sweat retention disease, the fact that hyperhidrosis is frequently associated with dyshidrosis and is known to aggravate it is well known. It may be a sign of mycotic infection, of contact dermatitis, drug allergy, psychosomatic disease or other. In any case it is well known to occur soon after the development of a contact dermatitis and it may persist for a long time after the source of the original contact dermatitis has been eliminated and after the contact dermatitis has cleared. It is well to be aware of this condition as a cause of apparent chronicity. Treatment of dyshidrosis is not satisfactory at this time.

One should be familiar with the isomorphic response because of the effect injury to the skin has on those dermatoses that are associated with this reaction. It is characterized by reduplication of primary skin lesions of the type caused by the disease in question and as a result of injury to the skin. Those diseases are primarily Psoriasis and Lichen planus.[9] There are other diseases as well that may be aggravated by certain types of industrial exposures. These are acne vulgaris, rosacea, seborrheic dermatitis, atopic dermatitis, and the tendency to keloid formation.[9] Apparent chronicity of an industrial dermatosis may merely be the manifestation of the isomorphic response in a person who already has a skin disease that responds in this manner or who has a diathesis for any of these diseases.

The inability of a worker properly to cleanse himself and to rid himself of noxious materials, by virtue of poor facilities, poor cleansing agents, inaccessability to these or lack of them,[10] frequently create a problem of chronic skin disease from one which could have been acute and self-limited. The use of strong cleaning agents such as naphtha, gasoline, kerosene, and poor soaps is to be deplored, especially for the individual who already has an irritated skin. The provision of proper facilities with mild soaps[11] and soapless cleansers[11,12] is a simple matter and should be mandatory.

A comment about the effect of systemic disease on industrial dermatitis is in order. It need hardly be dwelled upon that the body is a whole organism and responds as such, each part reacting with and responding to stimuli from other parts. It would be a poor statement semantically to say that the body has, for example, liver disease but the skin is in perfect condition. Medically and logically we know this is false. It behooves all of us as physicians to treat the sick organism as a whole and not the sick organ alone.

Cross Sensitivity

It is well known that cross sensitivity may develop in a person who is allergic to one of a

group of chemically related compounds and that the sensitivity may broaden to include a number of them. Further, it is well known that a patient with an eczematous skin has a greater chance to develop multiple sensitivities than does a person with a normal skin. The more medicaments that are put on the skin in eczematous state and the longer they are used, the greater is the chance for a sensitivity to develop. This also is true in normal skin. The relative rates are different and that is what should cause concern.

Malingering

Skin disease cannot be feigned. It is either present objectively or not. It may, however, be produced by the patient willfully. The worker may expose himself to chemicals he knows will cause his skin to erupt. The purpose of this type of malingering is gain, either financial or psychological. In times when jobs are difficult to find, or for the worker who is excluded from new work because of previous skin disease, the gain is financial. When these problems do not exist, other facets must be explored. Proof of malingering is exceedingly difficult and at times may require methods that are not above reproach. It is hoped that better compensation laws will diminish this social problem.

Summary

A review of the factors that tend to produce chronicity in occupational dermatoses has been presented.

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INSTITUTE ON OCCUPATIONAL HEARING LOSS
Colby College, Waterville, Maine

This course presented by Colby College for nine consecutive years is designed to train physicians interested in this problem, nurses, plant engineers and others in initiating and conducting hearing conservation programs in noisy industries. The curriculum includes discussion of the causes of occupational deafness, but is primarily concerned with its prevention. In order to allow for maximum individual instruction, course enrollment is limited. The diversity of experience of the faculty members, assembled especially for this course, provides an unusual opportunity for personal consultation on any aspect of occupational hearing loss.

The dates of the course are August 14-19 and the fee of $200 includes tuition, board and room. Requests for further information should be made to WILLIAM A. MACOMBER, Colby College, Waterville, Maine.

FREDERICK T. HILL, M.D., Director
JOSEPH SATALOFF, M.D., Assistant Director

A New SURGICAL SKIN CLIP For Wound Approximation

• ADOLPH M. BROWN, M.D.
Beverly Hills, California

The closure of skin lacerations or incisions is commonplace for almost every physician, especially for those associated with industry.

The primary goal in the repair of any skin incision, be it an accidental wound or intentional incision, is to close the body's portal of entry to bacterial contamination, to assist in reducing bleeding, and to redraw the body's armor together to maintain function. A secondary goal, too often disregarded, is a pleasing cosmetic appearance of the incision line after healing. A new, easy-to-use, rapid skin closure device* has been designed that will allow any surgeon or industrial physician to close skin lacerations, even in the facial area, with an end result as neat as would be expected with specific plastic surgery.

Skin Clips

Wound approximation with skin clips has found only limited use until now because:

1. The penetration points are large in cross section (diameter) as compared with silk, cotton or plastic suture material.
2. The points are not sharp, as compared to a needle point.
3. The bodies of the clips project high over the skin and thus make it difficult to apply pressure dressings over them.
4. The points are more than 0.035 inches in length and consequently penetrate deeper than the full thickness of the skin.
5. These points tend to leave permanent marks after removal.

What would be welcome therefore, is a skin clip which operates simply and quickly and efficiently. The clip itself should have:

1. Penetration points that are sheared, and as sharp as surgical cutting needles.
2. Penetration points that are exceedingly small in cross section.
3. Bodies that do not protrude over the wound, (i.e., that do not saddle the wound upright, but lie flat).
4. Tiny spicules, less than 0.015 inches in length, that cannot penetrate the full thickness of the skin (and rarely draw blood).

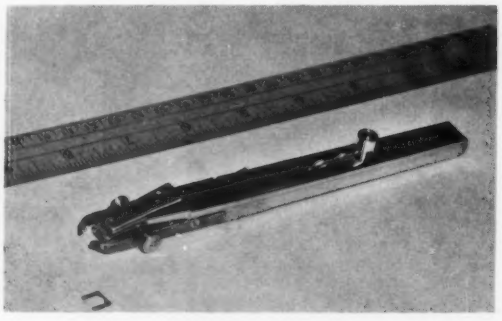

Figure 1
The skin clip applicator, with one clip in the lower left portion of the illustration.

From the Department of Surgery, The Mount Sinai Hospital and Clinic, Los Angeles, California.

*Manufactured by Ethicon Inc., Somerville, New Jersey.

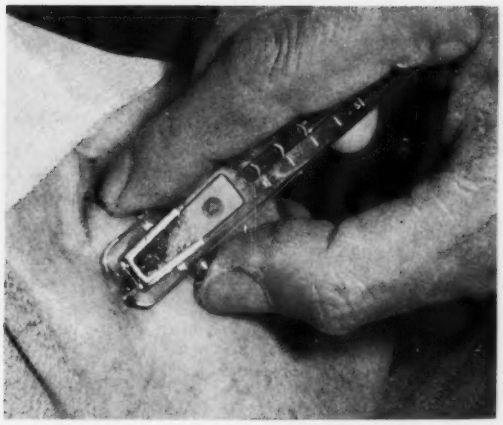

Figure 2a
A skin clip being placed in position. Pressure with the thumb and forefinger on the compressor buttons inserts the clip.

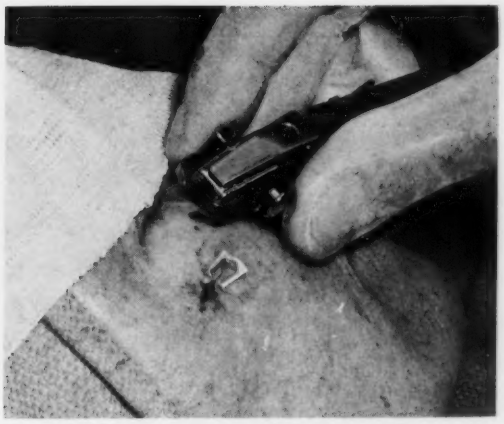

Figure 2b
The skin clip in place.

A New Skin Clip

A new skin clip apparatus has been designed and is now undergoing extensive clinical trials (e.g. plastic surgery closures, repair of tumor excisions, varicose vein excision closures, etc.). Results to date have been so satisfactory that it is felt this preliminary report will be of value to all physicians in need of a plastic surgery type of skin closure. It also is felt there is a special need for such a device for use in industrial emergency rooms, hospitals, or wherever immediate, accurate skin closure is indicated.

The apparatus consists of a stainless steel applicator (handle) which holds 10 skin clips in tandem (Figure 1). There is enough excursion of the points of each clip to bring the skin edges in gentle, but accurate, approximation. At the same time, there is sufficient marginal eversion for a good cosmetic effect.

Figure 3
Loading the applicator. The clips are in place and the loading cartridge is being removed.

The skin edges are kept in proper approximation and eversion by the gentle curve of the tiny spicules engaging the skin. The spicules are comparable in diameter to fine silk, and may be used upon the face. (Figures 2a and 2b). Like sutures, they should be removed early, preferably in 72 hours, except when they are used on motion areas such as the neck or limbs. Clips that are so fine should be used only for approximation, and never for traction.

The instrument is easy to load. The clips are arranged in lineal order mounted on a loading cartridge. The cartridge is laid upon a track in the applicator handle, with the clip points pointing downward (Figure 3). The clip applicator is then closed, and the loading cartridge is pulled out.

The empty cartridge strips out easily, leaving 10 clips in tandem in the applicator handle. After a clip is applied, a touch on a feeding arm releases the next clip, which is pushed in position for the next closure by a compression spring. The action is neat and rapid.

The instrument is held under the hand (like a violin bow) almost horizontally over the wound (Figure 2a). It will be found that fine toothed forceps or skin hooks rarely are necessary.

For the best cosmetic results, one should seek the same size bite on each side of the incision margin. This done, gentle pressure on the buttoned compression arms of the instrument brings the limbs of the clip inward and the skin edges into excellent approximation. The accurate, obliquely curved spicules of the clip ease the wound edges into the proper degree of upward eversion.

The clips lie almost flat upon the skin. When they are applied close together they overlap in fish-scale fashion. If necessary, they may be

Figure 4
Four skin clips in place closing a wound adjacent to the eye. Small, pressure dressings are easily applied over such a closure.

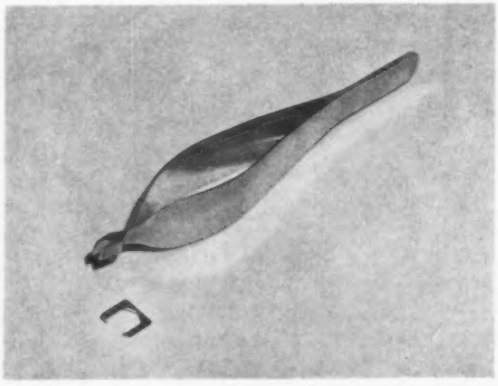

Figure 5
Clip Remover.

Figure 6
Removing skin clips from multiple wounds. The two lacerations on the right have had the clips removed.

applied quite close together (Figure 4). Pressure dressings over these flat, plastic surgery clips cause no discomfort.

The spicules of the clips are manufactured in such a way that no radius or arch is permitted at their cutting points. The clips are not "punched out," as are ordinary clips; they are sheared to shape. They are sheared so fine that they "catch" into the keratin layer of the skin somewhat as a cockle-burr snags onto cloth. They penetrate enough to hold firmly, yet so slightly that a local anesthetic rarely is necessary. The instrument and clips may be autoclaved repeatedly. The clips are of stainless steel and have been tested against oxidation in saline and Ringer's solution.

Wound Closure

It should be emphasized that the same rules of skin closure still apply whether using these meticulously crafted clips or any suturing thread. Traction sutures, where needed to relieve the tension upon the skin, should be buried below the skin, before the actual skin closure is commenced.

It is not advisable to use these skin clips on the upper eyelids unless a dressing is arranged to prevent them from coming in contact with the lid margin.

Where extensive wounds are involved, two or more applicator instruments are used, the nurse handing the surgeon a freshly loaded instrument as each is emptied.

Clip Removal

The clips are removed with a simple thumb forceps clip remover (Figure 5). The limbs of the forceps are so bent that the ends spread apart in action. The ends are inserted between the limbs of the clip. Compression on the removal forceps spreads the points of the clip, and lifts the clip out of the skin. It is rare to see a drop of blood when removing these delicately pointed clips (Figure 6). The cosmetic effect is excellent.

Summary

A surgical clip has been designed that makes it possible for the general surgeon and the industrial physician to perform closure of skin lacerations and incisions with a closure as neat as would be expected in plastic surgery. The device works faster than thread stitching. The instrument and clips, easily "flash" autoclaved, boiled, or cold sterilized without injury, are always conveniently at hand. The device has proved effective for the tiniest wound requiring a single clip, as well as for long lacerations requiring scores of clips.

THE MECHANISM OF COUGH; A Review

• ESTHER M. GREISHEIMER, M.D., Ph.D.

The useful cough is a protective reflex, essential to life. Its chief function is to protect the lungs from "a dangerous external intruder or internal enemy. The cough is the watchdog of the lungs."[1] Dr. Jackson was critical of medical men and surgeons of whom he said, "they continually drug this watchdog asleep when his efforts are most needed." He was referring to the danger of using morphine to suppress the cough reflex in the preoperative and postoperative periods. Although we purposely abolish the cough reflex during anesthesia if an endotracheal tube is used, we fully expect a postanesthetic patient to be able to cough by the time the operation is over, in order to protect himself from aspiration pneumonia and obstruction of the airway.

If a patient is paralyzed, as in poliomyelitis, or has had a tracheotomy, mechanical devices simulating effective coughing are used to eliminate retained bronchial secretions.

There are useless coughs that are harmful to the patient. These are nonproductive; they exhaust the patient and interfere with normal respiratory and circulatory functions.

Reflex Pathway

Since the cough is a reflex, it depends on receptors, afferent nerves, a center in the nervous system, efferent nerves, and effectors.

Not much is known about cough receptors in man, but it is probable that there are two types, one responsive to mechanical stimuli and the other to chemical stimuli. Those that respond to mechanical stimuli are thought to be the rapidly-adapting stretch receptors,[2] since these are found concentrated in those areas of the respiratory passages most sensitive to mechanical stimuli in the cat. The larynx is the most sensitive area, as you know well if you have ever aspirated a particle of food or a drop of water. The carina is the second area of high sensitivity. This is the ridge at the bifurcation of the trachea, between the origins of the right and left main stem bronchi. The third area is the entire lower half of the trachea.[3,4] The main bronchi are apparently insensitive to mechanical stimuli. It is evident that more information is needed to clear up the question of mechanical cough receptors in man. One wonders why the usual touch receptors, which abound in the skin, are not present here.

The receptors that respond to chemical stimuli are likewise a matter of speculation. The bronchioles and lungs themselves are very sensitive to chemical stimuli, such as sulfur dioxide and other irritating gases in exceedingly low concentrations, but the trachea and larger bronchi are relatively insensitive to chemical stimuli.

The vagus nerves contain the afferent fibers that transmit impulses from cough receptors to the central nervous system. When there is unilateral section of the vagus to alleviate the pain in patients with advanced inoperable bronchogenic carcinoma, the cough reflex is abolished.[5]

The cough center is assumed to be in the medulla,[6] although its location has not been determined with precision.

The principal efferent pathways are the phrenic and intercostal nerves, although the nerves that supply all of the muscles used in forced respiration are likewise involved in vigorous coughing.

The diaphragm, intercostal muscles, the muscles of the larynx and abdominal wall, together with those which elevate and depress the ribs, are involved in coughing. The muscular contractions may be so violent that ribs are broken.

One investigator[7] has suggested that the smooth muscle of the bronchial tree should be included in the list of effectors, since he thinks that it aids in the removal of foreign material by a peristaltic wave, of high speed, originating in the small bronchi and ending at the vocal cords. This possibility is denied by other observers, who find no evidence of such a progressive wave of contraction in the tracheobronchial tree.[8,9] Jackson,[10] who made bronchoscopic observations on the cough reflex, stated that pus seemed to be forced up by squeezing of the lungs during expulsive compression. Therefore, evidence for peristaltic waves in elimination of secretions is lacking, and pressure changes alone can account for the alterations in the tracheal and bronchial diameters, to be discussed later.

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Sequence of Events

The most satisfactory work on the dynamics of the cough mechanism has been done by the group at the University of Rochester, and much of the following information is from their report.[9] They carried out three separate studies on the cough mechanism. In the first, they made recordings of esophageal pressure (to indicate intrapleural pressure) and air flow rates, simultaneously with high speed cinefluorographic records of changes of the tracheal shadow during a series of voluntary coughs in a normal individual. In the second study they made a series of tracings of projections of several roentgen ray motion pictures of coughs from patients having Lipiodol in the lung airways. Measurements were made at various points to show the presence or absence of a wavelike motion by change in tracheal and bronchial diameters. In the third study a section of human trachea was placed in a bottle in which it could be subjected to varying positive pressures. The outline of the tracheal cross section as it would appear on bronchoscopic examination at various positive pressures was traced. By combining these methods of study, valuable information about the cough reflex has been obtained.

The cough begins with a rapid inspiration, lasting about 0.65 second, during which there is a rapid intake of about 2.5 liters of air. This is equivalent to an inspiratory flow rate of 3.85 liters per second (0.65:1::2.5:x). The amount inspired is about five times as great as the average tidal volume, and it is thought to be accommodated in the dilated and expanding bronchi to a far greater extent than in the alveoli, since the bronchi are markedly dilated at the peak of this initial inspiration.[4] This was determined by roentgen ray cinematography.

The second event is the closure of the glottis, which lasts about 0.2 seconds, and serves to entrap the air that has just been inspired.

The third event is an explosive expiratory blast, during which 2.5 liters of air are expelled in about 0.5 second after the opening of the glottis. There is a simultaneous widespread constriction of the trachea and upper bronchial tree[11] as shown by fluoroscopy.

Pressure Relationships

During the initial inspiration of the cough, the intrapleural pressure decreases; that is, it becomes more negative, by about 20 mm. Hg. When the vigorous expiratory effort is made, with the glottis closed, the intrapleural pressure becomes positive and rises to seemingly impossible heights. In ordinary coughing it rises to between 50 and 100 mm. Hg, and in more violent coughing it rises to about 250 mm. Hg. In the very vigorous coughing that leads to syncope the intrapleural pressure rises to a maximum of 300 mm. Hg.[12] In prolonged paroxysms of coughing, which may last several seconds without the patient taking a breath, this high intrapleural pressure is maintained until a breath is taken or the paroxysm ends. In intermittent coughing, with an inspiration before each expiratory blast, there are extremely large and rapid fluctuations in intrapleural pressure.

It has been found that after the intrapleural pressure has built up to a high level and the glottis opens, the pressure does not immediately fall to below atmospheric but continues to rise still further momentarily[13]; this was determined by electronic methods of recording. The continued rise in pressure indicates that the expiratory muscles contract even more forcibly after the glottis opens than before. The diaphragm is pushed upward by the abdominal viscera as the muscles of the abdominal wall contract forcefully, and the ribs are depressed by the muscles used in forced expiration.

The exceedingly high intrapleural pressure just preceding the expiratory blast compresses the trachea and bronchi, narrowing their lumina. The importance of this will be shown presently.

Flow Rate and Linear Velocity

The inspiratory flow rate, as stated previously, is about 3.85 liters per second. The expiratory flow rate reaches a sharp peak in the brief instant following the opening of the glottis, and then there is a period of almost uniform flow rate.[13] It may be greater than 11 liters per second during the peak flow rate and from five to 6.5 liters per second in the sustained period.

It is interesting to calculate the linear velocity of the air in the expiratory blast.[9] If a diameter of 1.4 cm. is assumed for the uncompressed trachea, the cross section area is about 1.5 sq. cm. (πr^2). With a gentle cough only one liter may be expelled in one second. Since the linear velocity is the volume divided by the cross section area, it is equal to 667 centimeters per second, equivalent to a 15 mile per hour wind.

With a violent cough 6.5 liters may be expelled in one second. In the uncompressed trachea the linear velocity of this blast is 4,333 cm. per second, equivalent to a 97 mile per hour wind.

As the intrapleural pressure is increased the tracheal diameter is decreased. Mean linear velocity varies inversely as the cross section area, consequently, if a constant flow rate is to be maintained during the expiratory blast, there must be a large increase in linear velocity.[9] The greatest compression, or smallest tracheal diameter, was noted at 0.85 second after the begin-

ning of the cough, just when the intrapleural pressure was highest. Moreover, a reduction in the apparent diameter occurred simultaneously in all the bronchi measured and along the whole span of trachea included in the measurements. At the end of the cough the return to normal diameter occurred simultaneously in the entire extent of the upper airway. This evidence rules out the possibility of a peristaltic wave in the smooth muscle of the tracheobronchial tree during coughing.

If we assume that the high intrapleural pressure compresses the trachea to one sixth of its normal cross section area, then the linear velocity will be six times greater than before, or 582 miles per hour. When this is compared with the speed of sound,[9] we find that we fall just a little short of breaking the sound barrier in a violent cough (582/750=77%). It is evident that the decrease in tracheal diameter contributes to the increase in velocity of the expiratory blast. Some investigators still find it difficult to accept the fact of compression of the trachea by the high intrapleural pressure.[14]

The kinetic energy of a moving air stream increases as the square of the velocity. In the trachea that is compressed to one sixth of its normal cross section area, the force available to move material is 36 times greater than it is in the uncompressed trachea. It is small wonder that the particles of sputum can be carried as far as 12 to 15 feet by a cough.[15]

Various mechanical devices have been developed for aiding the removal of secretions from the bronchi of individuals who are unable to cough effectively.[16,17,18] What is lacking is the effect of the high intrapleural pressure on the trachea and bronchi, that is, the means of increasing the velocity of the air flow. The flow rates are high, but the increase in linear velocity due to narrowing of the tracheobronchial tree is needed in addition.

Associated Changes

The associated changes in the circulatory system are important. The circulatory effects are proportional to the violence of the cough, so there are large changes in blood pressure with vigorous coughs. The arterial blood pressure rises to a high level during a cough, and then falls to a low level afterward. If it falls to the critical level of 50 mm. Hg, cough syncope occurs. This is more frequent in middle aged men than in younger men and in women. In the last it is rare indeed. Cough syncope does not occur in individuals who have productive coughs. As one heads toward cough syncope the vision becomes blurred, the individual is unable to respond to commands, and consciousness is lost. Clonic twitchings and convulsions may accompany the loss of consciousness.[19,20,21] The pulse pressure decreases markedly and the heart rate may increase during the period of hypotension. Blood accumulates in the peripheral veins and this decreases the filling pressure of the heart, leading to a fall in stroke volume and cardiac output. It is possible that the aorta may be compressed when the intrapleural pressure greatly exceeds the arterial blood pressure.

During coughing the cerebrospinal fluid pressure rises immediately to the level of that in the thorax.[22] When this occurs the blood flow to the brain is greatly curtailed. It is evident that there are several possible explanations for cough syncope.

There are many conditions that produce upper respiratory "tickle." Some of these are smoking, drinking, infected teeth, and postnasal drip. The tickle may become a habit. Since this type of coughing is useless, and harmful to the patient, it should be stopped.

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THE PREGNANT WOMAN IN INDUSTRY

A Report from the State of Illinois Department of Public Health

The need for protection of employed women in the United States has taken on additional significance with the increasing proportion of married women in the labor force. More than one-half of the gainfully employed women are married. With the high marriage rate prevailing at the present time, the birth rate may be expected to continue at a high level for years, and problems relating to the employment of pregnant women and a program of maternity benefits will be of concern to employees, employers, the medical profession, and health and welfare organizations interested in the health of employed women.

According to the somewhat startling information published by the United States Department of Labor, Women's Bureau, it is estimated that by the end of the coming decade the number of women workers in the nation will increase by as much as 25%. In round numbers, this means there will be about 30 million women workers — six million more than in 1960 (see graphs opposite).

The increased employment of women presents a two-fold problem having to do not only with the effect of industrial work on the woman, but the effect of pregnancy on the capacity of the woman to remain employed. It is to be expected, therefore, that one of the first questions in this area an employer will ask is, "How can the pregnant woman continue to be employed with efficiency and without risk to her health and that of her unborn child?" The question which is frequently coupled with the first is, "How long may a pregnant woman be expected to continue to work safely?"

The policy of dismissal of women workers as soon as they are known to be pregnant, or shortly afterwards, has resulted in the concealment of pregnancy for as long as possible by a substantial number of pregnant women. The results of continued employment of pregnant women without adequate health supervision can be serious for both employees and employers.

It appears that a reasonable approach to the problem is a sound "maternity policy" that will encourage women to seek prenatal care early in the pregnancy, and to report a state of pregnancy early, with the understanding that their employment will be continued, based upon health factors. Such a policy would prevent pregnant women workers from being penalized economically for being pregnant, and would make continued employment dependent upon their health and

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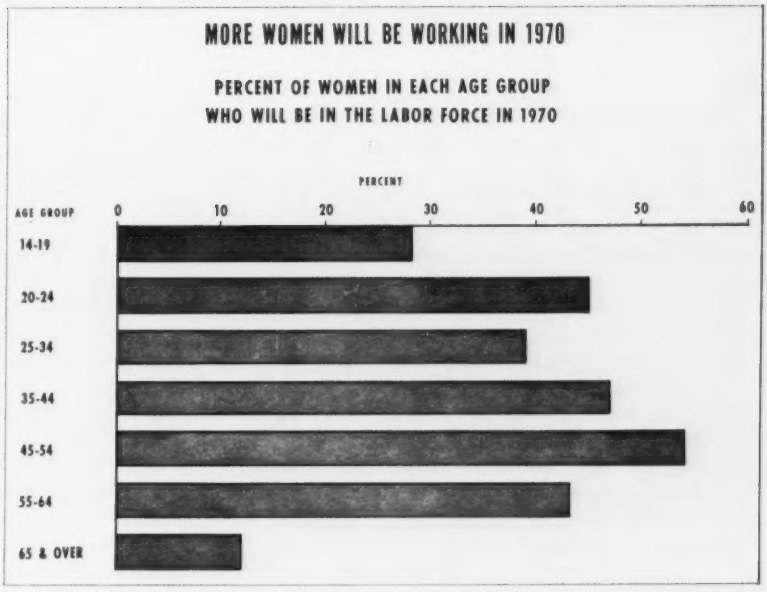
Single copies of the complete booklet, *Suggested Policies for Pregnant Women at Their Place of Employment*, on which this report is based, may be obtained by writing to the Department of Public Health, State of Illinois, Springfield.

welfare rather than on an ill-founded arbitrary rule requiring prompt removal from their jobs.

When a "maternity policy" is established by the employer, all women should be informed about it in detail at the time of their employment. A printed copy of the plan, giving specific instructions for procedure in the event of a pregnancy, should be distributed to the new employee by the nurse or personnel director. Another suggestion for establishing and maintaining cooperation in a program concerning pregnancy would be the use of a payroll insert card that could be designed to inform all employees about the maternity plan for employed women.

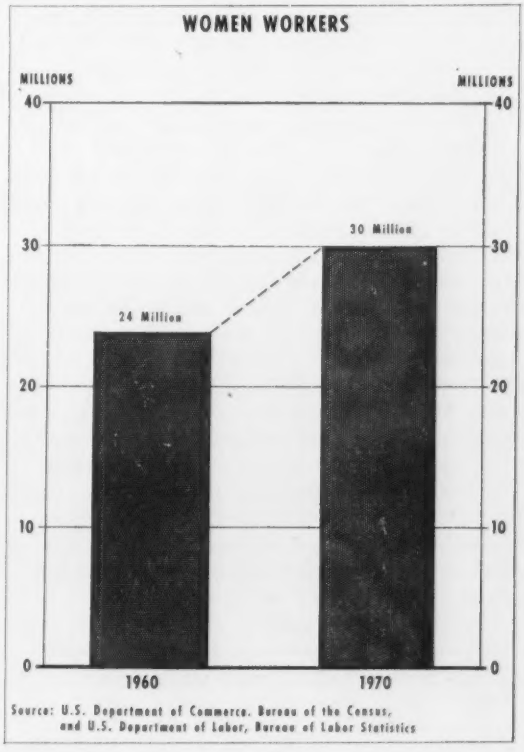


The plant physician and nurse, or employer, should refer pregnant employees to their family physicians for medical care. If the employee is unable to pay for private medical care, she may be directed to one of the community clinic services. The kind of work performed by the employee should be fully explained to the family physician or clinic service so that they may determine whether the employee may continue to work at her present occupation and at what period in her pregnancy she should stop working.

As soon as the nurse knows an employee is pregnant, plans can be made for regular interviews. Pregnant employees usually are not seen by the plant physician unless he is called on to evaluate a work-connected situation that might have an adverse effect on the woman's condition.

Such a health plan can be successful and beneficial only if both management and the employees recognize that certain responsibilities and obligations are incumbent on both sides. Much of the success of this health program will be through the cooperation of the family physicians or obstetricians in the community. These physicians must become informed about employment, industrial demands, and the regulations pertinent to them so that they can advise the pregnant employee fairly and accurately. The maternity problems of commerce and industry are an integral part of the maternity problems of society as a whole and deserve the combined interest of all persons concerned.

There have been repeated requests for a statement of policy or a reliable guide for employers who may have the safety and well-being of pregnant women to consider. The following "Suggested Policies for Pregnant Women at Their Places of Employment," prepared by the Department of Public Health, State of Illinois, may be used as a guide to employers in all 50 states.



Suggested Policies for Pregnant Women at Their Places of Employment

Medical Statement and Periodic Reports

Upon diagnosis of pregnancy, the employee should present a written statement from her physician to the plant health service, or to the personnel director, if there is no plant physician or nurse, which indicates the expected date of delivery and specific limitations for her work.

In the interest of the employer, as well as the employee, periodic reports from the employee's physician regarding her state of health should be obtained. The frequency of periodic reports is a policy to be worked out between the employer and the employee's physician. These reports will serve two purposes:

1. They will reveal that she is receiving regular medical supervision.

2. They will advise the employer if she should continue in her present job, be transferred to a less hazardous one, or her employment discontinued.

Continued Employment

Normally, the pregnant woman may continue employment, being transferred, if necessary, to lighter or more sedentary type of job. The work should meet these requirements:

1. Pregnant women should not be employed between 12 midnight and 6 a.m. They should not work more than eight hours a day, and preferably not more than 40 hours per week.

2. Every pregnant woman should have at least two 10 minute rest periods during her work shift, properly spaced to avoid fatigue, and with precautions taken to avoid situations that create a hazard, such as crowding at lunch time and quitting time. There should be adequate facilities for resting and opportunity to secure nourishing food.

3. Pregnant women should not be employed in the following types of work, but should be assigned to nonhazardous jobs:

(a) Jobs that require strain of muscles or joints, such as heavy lifting, stretching, continuous standing, prolonged sitting, stooping or walking, stair climbing many times a day or when carrying materials where the hands are not free for holding to railing.

(b) Jobs that require good sense of bodily balance, such as work on scaffolds or stepladders.

(c) Jobs in which there is marked vibration, as well as danger of severe injury, such as near power presses, power-driven woodworking machines, or polishing machines.

(d) Jobs involving exposure to lead and mercury compounds, aniline, benzol and toluol, nitrobenzol and other nitre compounds, carbon tetrachloride, ionizing radiation, and other toxic substances considered to be extra hazardous during pregnancy.

Leave of Absence

1. Eight weeks' leave before the expected date of confinement is generally considered minimum (optimum 12 weeks or more). At any time during pregnancy, a reasonable amount of additional leave should be granted on presentation of a certificate or signed statement from the attending physician stating that complications of pregnancy make the continuance of her employment prejudicial to her health or to the health of her unborn child. More time may be needed in the presence of prenatal complications (medical, surgical, or obstetrical).

2. After normal delivery, an extension of at least six weeks or more should be granted, unless the mother has no child for which to care, in which case six weeks may be sufficient. Additional leave should be granted for medical reasons when requested by the attending physician, up to a total of one year or in accordance with established plant policy in regard to leave of absence due to illness. This includes leave before and after delivery. Maternity leave, itself, should not be classified as "sickness disability."

3. Any woman employee absent from work on maternity leave should continue to accumulate seniority during the first four months of her absence, and thereafter should retain her full seniority until the expiration of the year, or in conformity with plant policy.

Flexibility in arrangements for extension of leave after delivery is highly desirable. In the interest of protecting the health and well-being of the mother, her newborn infant, and her family, sufficient leave should be granted to allow ample opportunity for the mother and a medical advisor to determine and provide the essentials to meet her requisites and that of her family while she is absent from home. When available, a social worker or counselor could be called upon to be of assistance to the family.

Dysmenorrhea — CAN BE COSTLY

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Since Biblical times there has been an aura of mysticism associated with the menses. This has been either a period of "uncleanness" or actually ostracism. It, in some form or other, has been transmitted down to us. Though we live in a so-called enlightened age, the complete answer to the menstrual cycle has not been established. Hormonal influence, of course, is the prime factor in establishing the menarche and its cyclic pattern until its cessation; but what are the factors involved in producing dysmenorrhea? Whether the cause be muscle spasm, neuromuscular irritability, vascular, emotional stress, or a combination thereof is certainly not proved.

It is not the purpose of this paper to enter into any controversy relative to the causes of dysmenorrhea, primary or secondary. This paper concerns itself with the frequency with which women in the childbearing age have discomfort with their periods and the bearing it has on industry. The estimates as to actual numbers are variable, being quoted as from 45% to 65%[1] to as high as 90% as reported by Miller.[2] Various authors, such as Randall and Odell,[3] have stated that one out of three women suffer from dysmenorrhea at one time or another. Stone and Warshaw[4] have stated that most women have some degree of pelvic discomfort with the menses, but about 30% of them have symptoms sufficiently severe to constitute a problem. This problem did not exist in industry in its current magnitude when the total female labor force was proportionately much smaller. However, with the advent of World War II when labor shortages developed, the need for productivity increased. The realization that women could perform many tasks brought a great surge of them into industry. Job satisfaction, independence, economic necessity, and other factors have continued the employment of female personnel at a high level since that time. The following simple chart shows the increase in the female labor force by decades.[5]

1920	8,250,000
1930	10,396,000
1940	13,000,000
1950	17,584,000
1960	22,500,000

As can be seen by the above tabulations, the female labor force now stands at 22,500,000. To the industrial physician, then, falls increasingly the problem of dysmenorrhea.

Dysmenorrhea, in essence, is a pain syndrome, and as such produces discomfort, loss of productivity, and absenteeism. Our attack on the problem is a bi-pronged one. The first step is to establish a degree of rapport at the time of preemployment physical examination. If the medical history suggests difficulty with the menses, the employee is made aware of the facilities present for her care, and she is invited to seek assistance at the clinic and not stay home. As in most industrial clinics, we have counseling visits which are aimed at correcting minor physical impairments and for the purpose of health education. These visits are scheduled to interfere least with work, and at this time the nurse has the opportunity to discuss good nutrition habits, exercise, and most important, to dispel

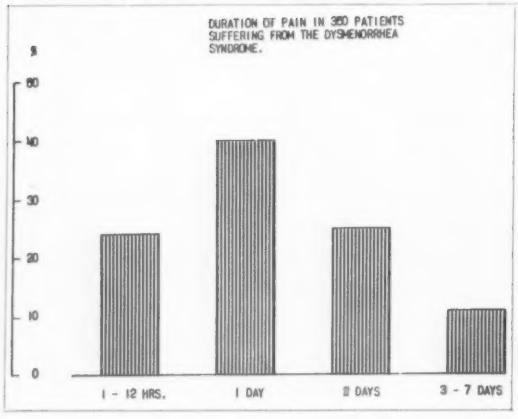

Figure 1

many of the false notions that exist relative to dysmenorrhea. Such things as, "Mother says I have to spend one day a month in bed as she did," or, "I never swim or bathe when I have my period," can be laid to rest if approached tactfully.

The next prong is to discuss the use of medication and to evaluate its effectiveness in the past. Should the evaluation suggest the need for medical (pelvic) examination, the nurse can and does suggest that the patient seek the advice of her family physician. Where no physician is known, every effort is made to insure adequate gynecological evaluation, including such measures as giving the names of several physicians in the patient's neighborhood who could

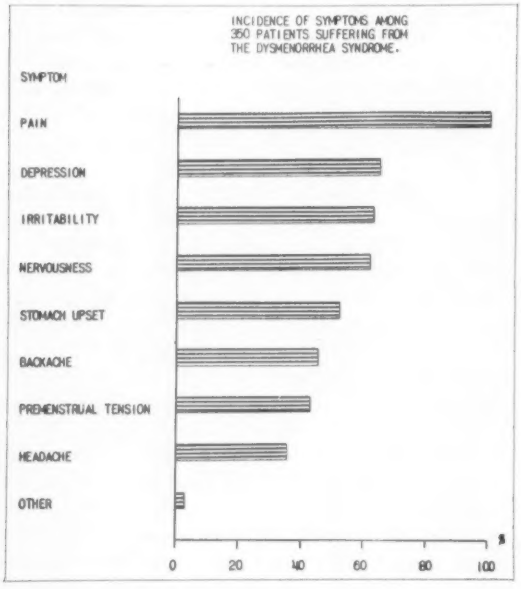

Figure 2

be of assistance. If, for economic reasons, the patient cannot have private care, the use of a free facility, such as a public clinic, is suggested. These steps form the basis of the original attack; and without doubt, interest of the nurse in the patient's welfare is the key to the whole problem.

It seems appropriate at this time to discuss medication for this pain syndrome. Her nonworking sister can take an analgesic and/or other medication and spend a day or two in bed, but the working woman must be treated differently. The drug used in industry must be rapidly acting, have a good analgesic effect, must not be hypnotic, and, of course, be relatively nontoxic. No medication we have used to date has been a panacea, nor can there be such. We have reviewed or tried a long list of sedatives, analgesics, antispasmodics, antihistamines, and muscle relaxants with a fair-to-good degree of success.[6,7] Our own experience over the past five years embraces a total of 16,702 patient visits for dysmenorrhea. During this period of time we have conducted four separate clinical trials, one of which was reported in the literature.[6] Most recently we conducted a clinical trial study on 350 patients over 512 periods.* Of these 350 patients, 94 were observed throughout two periods and 71 throughout three to eight periods. These periods did not tend to be consecutive for the reason that the majority of the subjects who secured relief from the medication did not return for additional observation after the first period until their medication had run out, usually several periods after the first observation.

This study showed that 85.1% of these patients were between ages 17 to 29 and that 84.6% of them were single; 97.1% had had no children, and dysmenorrhea began in 55.6% of them between the ages of 12 and 13. The onset of pain was before the start of the flow in 47.6% and after the flow in 52.4%. The duration of the pain was of less than 12 hours in 24.1% and of one day or more in 75.9% (Figure 1). Of more interest and importance in the symptomatic treatment of such a syndrome as dysmenorrhea is the type of symptom complained of besides pain itself. Our study showed that 65.2% complained of depression, 63.2% irritability, 62.3% nervousness, 52.3% upset stomach, 45.4% backache, 43.1% premenstrual tension, 35.4% headache, and 2.8% miscellaneous symptoms (Figure 2). This, then, becomes an important clue in the treatment of this symptom complex. It probably also explains why there have been only moderately good results

*The material used for this study, coded Product 17, was supplied by Grove Laboratories, Inc., St. Louis, Missouri.

with medications affecting only one system. Where so many of the symptoms are referable to the central nervous system, it becomes quite apparent that analgesic medication alone will not suffice; and, in turn, a tranquilizer will also fail in a great number of women. Antispasmodics will probably help only half the cases. It becomes apparent that to help the greatest number of individuals, a drug containing a combination of ingredients is necessary. We therefore used a drug combination containing standard well-known ingredients with the following formula, dispensed in capsule or tablet form:

N-acetyl-p-aminophenol	300 mg.
Adiphenine hydrochloride	30 mg.
Phenyltoloxamine dihydrogen citrate	35 mg.

The N-acetyl-p-aminophenol (APAP) is a modern, nonopiate, nonaddicting analgesic.[8] It is believed to be the active metabolic product of phenacetin.[9] Adiphenine hydrochloride[10,11] is a spasmolytic drug, with its chief effect directly on the smooth muscle, particularly that of the gastrointestinal and genitourinary tracts, rather than any parasympatholytic action. The phenyltoloxamine[12,13] possesses typical antihistaminic properties, but its chief interest in this study is its mild sedative effect. This sedation by antihistamines is a well-known action and does not require any further elucidation. The toxicity and pharmacological action of all these materials are well known and have been extensively studied and in the doses commonly used have a low rate of side reactions. The chief side effect was drowsiness, which occurred in 5.6% of the patients; the other side effects noted occurred in two or less percent (Figure 3). These reactions were extremely mild, and in no case was it necessary to stop the drug because of the side reaction.

The effectiveness of the medication in producing relief of symptoms is, after all, the reason for this study. There was complete relief of pain in 84.3%, partial relief in 5.8%, and failure in 9.8% (Figure 4). About 20.8% of the patients required three capsules a day, 37.8% required two capsules, and 16.1% only one capsule; 72.6% of the patients required the medication for only one day. As compared to other medications used by these patients, this study showed that 71.6% felt that this drug was faster in action, 69.3% that it was longer lasting, and 75.9% that it was more complete than medications previously used.

A review of these statistics shows, then, that roughly 90% of the patients studied in this series were sufficiently relieved in a short period of time to be able to return to their work effectively. This is a favorable result. In personal discussions with other industrial physicians and in journal reports on studies similar to this, the

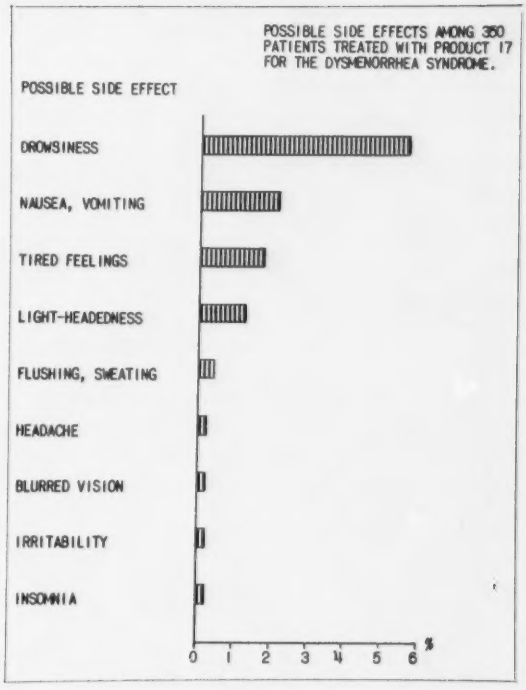

Figure 3

psychogenic effects of any medication are always stressed. It is true that there is a strong psychogenic effect in this syndrome, but in a critical clinical evaluation of any drug, this psychogenic effect is cancelled out, since it is operative whenever a drug is used.

Records of the response of our dysmenorrhea patients extending back to the time of their first employment, frequently over a period of years, provide a detailed basis for evaluating the response to new drugs. This background informa-

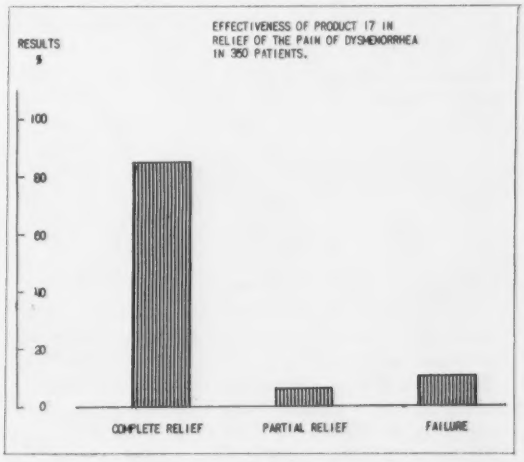

Figure 4

tion provides well-documented historical data for control purposes. Under such circumstances, the greater effectiveness of one drug over another can be attributed to the direct results of the drug itself rather than to the fact that it is a new material. This conclusion was emphasized by our earlier experiences with another new drug proposed for the treatment of dysmenorrhea which, on the basis of this same type of historical comparison, not only failed to prove superior, but was measurably less effective than previously used medications.

The low level of side reactions is an important point in the acceptability of any new medication which is used on a repetitive basis.

When a systematic effort to reduce time lost due to dysmenorrhea was first started about five years ago, this syndrome accounted for about 8% of our absenteeism. In a plant which employs nearly 4,000 women, this can be an important cost item, both in terms of sick-day benefits as well as loss of production. Within a two-year period this approach brought about a reduction in absenteeism due to dysmenorrhea by 50%, or 4% of all absentees; and by the following year, this was further reduced to 3.8% of all absentees.

This would lead one, then, to the conclusion that it is possible by a concerted and specific plan to reduce absenteeism due to dysmenorrhea by a significant amount. It is true that in the individual industrial plant this may amount to saving only a few sick days. However, with an increasing female labor force, which now involves over 20,000,000 working women on a nationwide basis, this saving can be very significant.

Summary

Dysmenorrhea is a syndrome which occurs to a varying degree in an industrially important percentage of women in the childbearing age. There are many theories of causation, and probably more than one factor is operative in each case. Our study shows that other symptoms besides pain itself, particularly those affecting the central nervous system and the gastrointestinal tract, must be taken into consideration in treatment. Medication which can control this syndrome with a minimum of side reactions can effectively reduce disability, increase productivity, and reduce absenteeism.

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Data on Schizophrenia

Schizophrenia, this nation's number one mental health problem, is on the rise, according to the March issue of *Patterns of Disease*, a Parke, Davis & Company publication for physicians. The disease, which accounts for the largest number of patients with mental disorders and for about half of all patients in mental hospitals, is usually recognized during the most productive years of life — from age 25 to 34.

Of patients with mental disorders, newly admitted to state hospitals, schizophrenia tops the list with 23%, followed closely by senile psychosis and cerebral arteriosclerosis which together account for 21%.

The rate of first admissions of schizophrenics to public mental hospitals jumped 32% between 1940 and 1950, and the rate has risen since then. Indicating that available statistics do not adequately describe the full measure of the incidence of schizophrenia, the publication points out that data on first admissions to public mental hospitals do not include mentally ill persons treated in outpatient services and in private practice. Not included in the figures are admissions to Veterans Administration Hospitals, where about 25% of the males between 25 and 44 and between 55 and 64 years are hospitalized for schizophrenia.

Schizophrenic patients stay in mental hospitals almost one and a half times longer than other mentally ill persons. Average hospital residence of a schizophrenic is 10.8 years, compared with 7.5 years for patients with other mental disorders. Only 10% of hospitalized patients with schizophrenia remain for one year or less, while 28% stay for more than 20 years. Of schizophrenic patients over 75 years of age, about 75% have spent more than 20 years in mental hospitals.

At the University of Michigan:

Training in Occupational Health At the Doctor of Philosophy Level

In the early days of occupational health work in this country chief activities centered about physicians all of whom possessed the academic M.D. degree. These physicians may have had associates and assistants, many with degrees in engineering, chemistry, and kindred sciences. There were no specific degrees in industrial hygiene, industrial medicine, etc.

As occupational health advanced in stature there came about for the physician the nonacademic degree indicating specialty certification. Somewhat earlier both for physicians and nonmedical industrial hygienists there were opportunities for higher earned degrees such as Master of Public Health (Industrial Health), indicating a specific degree in occupational health.

For a long time a number of outstanding industrial hygienists have possessed the degree of Doctor of Philosophy, but customarily these were granted in the fields of chemistry, engineering or related professional activities.

Now at the University of Michigan, but not as a unique situation, it has become possible to acquire the earned degree of Doctor of Philosophy (Industrial Health). This reflects an augmented status for industrial health as a branch of science and reflects an enhanced status for those in such professions. For the purpose of making this elevated status rather than the purpose of lauding the University of Michigan, the bulletin establishing this degree is here presented substantially in its entirety.

Students desiring to extend their training in the scientific procedures for provision of healthful working conditions may register in the Graduate School for work toward the degree of Doctor of Philosophy (Industrial Health). Students with a bachelor's degree in chemistry, physics, biology or engineering will be considered for admission in this program. Normally a student will have received the degree of Master of Public Health with specialization in industrial hygiene or the degree of Master of Public Health (Industrial Health) prior to becoming an applicant for this doctor's degree.

Before the student is accepted as an application for the doctor's degree and depending on his academic record and professional experience, he may be required to take a qualifying examination. An interview with the department chairman and designated advisor is highly desirable whenever possible. A doctoral committee is appointed to advise the student on course work and on selection of a research problem for his dissertation. This committee is available also for guidance in the conduct of research.

A program of study will be developed by the student's advisory committee to include appropriate courses in the basic and related sciences in each student's area of specialized interests. These will be selected primarily from courses open to graduate students in Public Health, Medicine, Engineering, Chemistry, Physics, Biological Sciences, Nuclear Science, and Business Administration.

The area of academic concentration of the applicant may be one or more of the following: (1) industrial toxicology, (2) instrumentation in industrial hygiene and air pollution, (3) air sampling methodology, (4) development of analytical methods for air and biological samples, (5) industrial ventilation for control of air contaminants, (6) air cleaning technology, (7) small particles and dispersions, (8) physical factors in industrial health including conditions of abnormal temperature and pressure, occupational exposures to ionizing radiation and to other radiant energy. Professional specialization includes the fields of (1) industrial hygiene, (2) industrial toxicology, and (3) air pollution.

Before the applicant may become a candidate for the doctorate, he must complete most of the prescribed course work, pass a preliminary examination at least one semester before the prospective granting of the degree and have approval of his dissertation subject. He must also have met the language requirements by demonstrating a reading knowledge of German and French. A substitution may be made for one of these languages in accordance with the rules of the Graduate School.

On acceptance of the applicant to candidacy, a satisfactory dissertation on the candidate's research work and oral examination on the dissertation and related material fulfill the requirements for the doctoral degree. This program ordinarily requires three academic years at graduate level though the actual time will depend upon the student's preparation and background. At the end of each semester a progress report will be required.

Courses Offered

A partial list of courses offered indicates the extensive resources available to the student in the development of course work. The courses required or available as electives by no means are limited to the Department of Occupational Health at the School of Public Health but are distributed over various university colleges and departments, including Environmental Health, Statistics, Meteorology, Chemistry, Mineralogy, Physics, Industrial Engineering, Business Administration, Biological Chemistry, Pharmacology, Physiology, Pathology and Zoology.

Courses available to applicants for doctoral degree in industrial health (Roman numeral refers to semester, figure in parenthesis is number of credit hours):

Environmental Physiology. II. (1)
Industrial Accident Prevention. II. (1)
Principles of Community Air Pollution. I and II. (2-3)
Industrial Hygiene. I. (2)
Industrial Hygiene Control. II. (2)
Air Sampling and Analysis. I. (2)
Industrial Hygiene Sampling and Analysis. II. (2)
Ventilation Control of Contaminants. II. (3)
Occupational Diseases. II. (2)
Industrial Health Seminar. I and II. (2)
Industrial Health Problems. I, II, and S.S. (2-4)
Sampling Methods in Air Pollution. II. (3)
Air Pollution Seminar. I and II. (2)
Field Experience in Industrial Hygiene. I, II, and S.S. (2-6)
Field Work in Air Pollution. I, II, and S.S. (2-4)
Industrial Toxicology. I and II. (2)
Occupational Medicine Seminar. I and II. (1)
Research in Industrial Health. I, II, and S.S. (2-6)
Instrumental Methods of Analysis. II. (2-3)
Research in Air Pollution. I, II, and S.S. (2-4)
Public Health Engineering Administrative Practice. I. (2)
Radiation Biology. I and II. (2-3)
Low-Level Radioactive Monitoring. II. (3)
Radiological Health Seminar. I and II. (1)
Principles of Radiological Health. I and II. (3)
Radiological Health. II. (3)
Field Work in Radiological Health. II and S.S. (2-6)
Biostatistics. I. (4)
Biostatistics. II. (3)
Introductory Meteorology. I and II. (3)
Principles of Meteorology. I. (3)
Atmospheric Thermodynamics and Radiation. I. (3)
Dynamic Meteorology. II. (3)
Micrometeorological Instrumentation. I and II. (3)
Applied Meteorology. II. (2)
Electron Microscopy. II. (3)
Industrial Processes and Air Pollution. II. (3)
Systematic Analytical Chemistry. II. (4)
Qualitative Organic Analysis. I and II. (3)
Physiochemical Measure. I and II. (1-2)
Quantitative Microanalysis. II. (2)
Electrical Methods in Analytical Chemistry. II. (2)
Optical Crystallography. I. (3)
Optical Mineralogy. II. (3)
X-Ray Analysis of Crystalline Materials. I. (3)
Introduction of Infrared Spectra. I. (2)
Applied Spectroscopy. I and II. (2)
Industrial Management. I and II. (3)
Public Relations. II. (2)
Principles of Organization. I. (2)
Personnel Administration. I. (3)

Additional courses of interest to doctoral candidates in the industrial toxicology area of industrial health include the following:

Introductory Biological Chemistry Lectures. I. (3)
Introductory Biological Chemistry Laboratory. I. (2)
Biochemical Techniques. Laboratory and Conferences. I and II. (2-5)
Principles of Pharmacology. I. (3)
Laboratory Pharmacology. I. (2)
Theoretical Basis of Drug Action. II. (2)
Drug-Enzyme Interaction. I. (1)
Relation of Physiochemical Properties to Physiological Disposition and Pharmacological Action. II. (2)
Human Physiology. I. (3)
Human Physiology Laboratory. I. (3)
Pathologic Technique. I. (4)
Comparative Physiology. I. (4)
Experimental Cytology and Histology. I. (4)

This extensive list of courses well reflects the striking diversity of subject matter available in pursuit of this higher academic degree in industrial health.

Profiles in Occupational Health

Sven Forssman, M.D.

On the Fiftieth Anniversary of his Birth

Professor Sven Forssman, Stockholm, Sweden

THRICE President of the Permanent Commission and International Association on Occupational Health; adviser to the World Health Organization in arranging the Occupational Health program in India; lecturer at the University of Alexandria, Egypt; member of the Occupational Health Committee at the General Assembly of the International Labour Organization, Geneva; leading personality at the Thirteenth International Congress on Occupational Health, at New York — these are among Sven Forssman's roles on the world stage.

In his own country, as Expert Physician of the Swedish Employers' Federation; Chairman of the Labor Protection Council; Co-chairman of the Association for Workers' Protection and the Swedish Medical Association; and Board member of Stockholm's Work Clinic, the Swedish Red Cross, and many other national associations for health and occupational safety, he is a central figure in his chosen field.

By usual standards, anyone so notably identified with so many important phases of national and international progress could be considered as having arrived — as being at the apex of a career of such distinction that a finial would be anticlimax. But the usual standards do not apply to an unusual man, and Sven Forssman is all of that — and more. One evidence is his own reaction to what he has done. Now, at age 50, notwithstanding the great way he has come, he feels that he is still on the long lane of his journey — "midocean," as it were, toward where he's going. As to where that may be, the augurs of predestination do not disclose. But in the light of his past and the record he has made, one may be certain that it is no objective of personal ambition. He is so much a man of superior abilities and sincere dedication that he does not need to seek titles or positions or preferments. They seek him. And grace themselves in so doing. To those who know him and who come within the influence of his personality, he is one of those rare "tall men who stand above the crowd in public duty as in private thinking." In person, he is a man of fine presence, gracious demeanor, and a calm and impassive bearing that belies the lightning play of his mind. It is an experience to observe him presiding at a meeting. The storms of debate and the nuances of silence all seem as responsive to his leadership as if they were the instruments of an orchestra following the invisible baton of his guidance. One just naturally knows that he is a skillful negotiator, and a superb diplomat. In the informalities of the day's demands, he is a pleasant person, good-hearted, one with whom it is impossible to start an argument. He is an accomplished linguist, with a remarkable fluency in English, German and French, in addition to mastery of the Scandinavian languages. All in all, he seems to have been created for international responsibilities.

As to how it happened that he was directed into a career in occupational health he says:

"In 1942 I was working in the Department of Internal Medicine at the University Hospital

at Lund, and my plans for the future were to stay in this field and try to become head of a hospital department in internal medicine. At that time in Sweden this field of medicine was rather overcrowded. As I had had most of my education and training at the University of Lund, I thought I would benefit from working at another university, and toward the end of 1942 I applied for a post as Assistant at the Department of Internal Medicine at Serafimerlasarettet, one of the hospitals of the medical faculty in Stockholm.

"In the middle of December, 1942, I gave a lecture at the Physiological Society in Lund on my studies on intermediary metabolism, and my friend, Professor of Pharmacology G. Ahlgren, invited me, together with my father, my wife and some friends, to a farewell dinner. We were joking about my future, and it was mentioned as a joke that I could apply for the post as Professor on Occupational Health at the National Institute of Health in Stockholm.

"A few days later, however, I got a letter from the Institute inviting me to apply. I thought it would be a useful experience for my future work in internal medicine to know something about occupational health, and on January 1 I started to work as Deputy Professor on Occupational Health during the vacancy. It was interesting that my training included a rather unusual combination of fields which fitted very well with my work in occupational health, as I had special training in chemistry, biochemistry, pharmacololgy and toxicology, as well as internal medicine.

"After some months' experience in occupational health I found that I was fascinated by this new field of medicine, combining theoretical research with practical studies in industry. I gave up my post as Assistant at the Department of Internal Medicine in Stockholm, worked hard during 1943 in research on occupational health, applied for the post as Professor, and was appointed on December 31, 1943, as Professor and Chief of the Department of Occupational Health at the National Institute of Public Health.

"I have always been happy that I made this decision to join the field of occupational health."

THUS Professor Forssman, on January 1, 1944, entered upon his duties as Chief of the Department of Occupational Health at the National Institute of Public Health. It was mostly due to him that this Department quickly developed into the leading occupational hygiene laboratory in Scandinavia. His immediate and most urgent tasks were to set up modern methods, to do scientific research, and to satisfy the needs of industry in the form of service work. In addition, he found time for developing the teaching of this field: in 1944 he became Special Lecturer in Industrial Hygiene at the Royal Technical Institute. He held this post for 11 years, and greatly broadened the training of the engineering corps in the field of occupational health. The year 1947 found him studying in the United States on a Rockefeller Foundation scholarship, where he met many American colleagues. One who knows him well chanced at the same time to be in the United States as a Rockefeller scholar, and he and Professor Forssman partly were studying together. He says: "I well remember Sven's thorough way of going deeply into different questions. He certainly made good use of his studying time."

The "special training" Professor Forssman mentions began in his home: his father, John Forssman, was Professor in Bacteriology at the University of Lund. Sven studied chemistry at Lund for several years, and did biochemical research work at the Kaiser Wilhelm Institut für Biochemie in Berlin in 1932-33. In 1933 he became Assistant in the Pharmacological Institute of the University of Lund, and he continued his studies at the Pathological-Anatomical Institute in 1934, at the Otiatric Clinic in 1935, and, postgraduate, at the Medical Clinic in 1941-42. His formal medical training was completed in 1938. In 1941 he debated to Doctor in Medicine with his thesis "Studien über Umsatz and Wirkungen der Bernsteinsäure in Vivo." His scientific interest was strong from the beginning and as a result he was appointed Assistant Professor at the University of Lund in 1941. This training gave him a firm foundation in the fields that are important in occupational medicine.

Professor Forssman has been a pioneer in the development of occupational health in his own country. As Secretary to the Swedish Medical Association in 1946-47, he spread information on this field among Sweden's entire medical profession. In 1957 he was elected Co-chairman of the Swedish Industrial Medical Association, which post he still holds. In 1949 he accepted, on a part-time basis the duties of Chief Factory Inspector of the Labor Inspection.

The year 1951 marked an important step in Professor Forssman's career. A new generation, trained by him, had grown up at the Institute of Public Health, and he could leave the Institute in the hands of his students. And so he moved into the service of the Swedish Employers' Federation, to create a new field of activity. His excellent basic training and the varied experiences gained at the Institute of Public Health made him an excellent counselor for industry in occupational health questions. Quickly he created around him an effective office, and

during the past 10 years the work of his office has borne beautiful fruit in practice for the health care of the workers in Swedish industry. He continued also as teacher of occupational medicine at "Karolinska Institutet."

Meanwhile his usefulness and abilities as adviser had been noticed elsewhere in the world. The World Health Organization used him as consultant in occupational health problems in 1950-52. In 1955 he was active in the Southeast Asian area, especially in India as consultant; and in 1958-59 in the Near East, lecturing, among other activities, at the Alexandria School of Public Health, where the World Health Organization had established an Occupational Department. His serious attitude toward everything he undertakes became apparent from the fact that, instead of spending his evenings after the lectures on the beaches or at the night clubs of Alexandria, he was energetically studying Arabic. One of his friends says: "My surprise was not small when, on a trip to India, I stopped in Alexandria one weekend to see him. I met him in his hotel room where — under the watchful eye of a teacher wearing a fez — he was sweating over the copying of intricate Arabic letters."

Naturally, he was also called, as member, to the correspondence and advisory committees of WHO and the ILO, and both of these international organizations have made use of his authoritative knowledge in many other ways. His contributions were especially remarkable in the Labor Conferences of ILO in 1954-55 and, in 1958-59, in the committees dealing with the health care of the workers. The Industrial Medical Associations of several countries have called him as their honorary member. On the walls of his study there are honorary membership certificates from associations in this field in the United States, England, Finland, Argentina, France, and Mexico.

His contributions to the literature are numerous. They comprise some hundred publications covering the fields of biochemistry, pharmacology, occupational hygiene, and industrial health service. In addition, he has considered as one of his important tasks the writing of popular articles, and through these he has spread information on occupational health in many different circles. Among them may be mentioned "Aldre i industrin" (The Aged in Industry), "Ont i ryggen" (Back Aches), and "Företagshälsovard" (Industrial Health Services). In his publication activities, he is also a member of the editorial staffs of several journals. He was editor-in-chief of *Nordisk Hygienisk Tidskrift* in 1946-51, and has been editor of *Hygienisk Revy* since 1956. Along the years he has added to his knowledge by foreign study trips to most European countries, the United States, Canada, and Mexico.

In his every activity, Professor Forssman has the wonderful support of his charming wife Mait, whom he married in 1937. Their home is in Djursholm, one of Stockholm's suburbs. The Forssmans' have two daughters and three sons, the oldest and the youngest being girls. Sven Forssman likes to play the piano; music is close to his heart. In his study at home he has a large library, and a cherished collection of knives which he has carefully chosen from all parts of the world. Sports are not strange to him, either. He often may be seen on Stockholm's beautiful golf course. A few years ago he acquired a summer home in Sweden's wild forests, far from Stockholm's noise and rush. In Rotary he has found a field of activity closely related to his own work. At the Rotary Club he meets representatives of other professional fields, learns from them, and teaches them. His most famous Fellow Rotarian is without doubt the present King of Sweden, who belongs to the same club.

During the years, Professor Forssman has gathered about him a wide circle of friends among whom are representatives of his field of work from all over the world. One group is particularly close; as founder and secretary of the European Ramazzini Society, he has his central place in this circle.

He is not given to forecasting, but there may be a small hint of his intentions in the following expression of his thinking:

"Progress in occupational health depends very largely on exchanging experiences between the research workers in different countries. From my study tours, and from my work with the WHO in other countries, I know the great value of learning from other people's experiences.

"Living in other countries for some time has given me the opportunity to learn more about their traditions, not only as to occupational health, but also in connection with the history of the country and its people. This is in order to understand their ways of living and thinking. If people from different countries would meet more often and try to understand each other's problems, I am convinced this would be of great importance in the progress of the world."

On the basis of the foregoing it may not be out of order to predict that the last half — the yet-to-be-lived — portion of Sven Forssman's career will see him attain distinction as a builder of bridges — sturdy spans of friendship and understanding and common aims among the nations and the peoples of all parts of the earth.

—LEO NORO, M.D.
Institute of Occupational Health
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Books

Toxicology and Biochemistry of Aromatic Hydrocarbons

H. W. Gerarde. $6.00. Pp. 329. Elsevier Publishing Co., New York, and D. Van Nostrand Co. Ltd., London, 1960.

Time was when the majority of publications on occupational health were encyclopedic. Later came a period in which the majority of book publications was still general and was devoted to group coverage such as the solvents, the pneumoconioses, the industrial dermatoses, etc. Currently, but certainly not exclusively so, the trend is to specific topics, such as one disease as silicosis or one substance such as chromium. The book here reviewed falls into this third category since it is precisely devoted to benzene and some of its derivatives.

Although the author of this book is a physician as well as a doctor of philosophy in chemistry, and although the prime word in the title is toxicology, the contents of this book run more to chemistry and biochemistry and to laboratory toxicology rather than to clinical toxicology, but that aspect is fairly well covered. While publications on benzene are legion many contain no newness, but this one does. It is strikingly fresh and adds much to the knowledge of benzene and its major compounds important to industry. This is particularly true of Part II (Part I is general) which in addition to benzene itself relates to other derivatives in the chapters now mentioned:

Mono-alkyl Derivatives of Benzene.

Di-alkyl Derivatives of Benzene.

Poly-alkyl Derivatives of Benzene.

Dicyclic and Tricyclic Aromatic Hydrocarbons.

Polycyclic Aromatic Hydrocarbons.

Aromatic Hydrocarbon Mixtures: Solvents, Fuels, and Lubricants.

Every good book should provide items for debate and this book is no exception. For example, it states that chronic benzene intoxication may arise years after the actual exposure to benzene has ceased and may prove fatal. If this statement contends that such a condition may arise many years after exposure without any manifestations whatever near to the time of exposure, this may be denied by some, but more likely it would be pointed out that great difficulty would attend the establishment of precise proof that the condition was in fact attributable to a long antecedent exposure to benzene. All too many therapeutic agents in recent use possess the capacity to incite a pathological state with at least some resemblance to chronic benzene intoxication. Such statements are conducive to litigation, and unmerited difficulties may arise.

This book is outstanding as a contribution to industrial toxicology and also is in the best traditions of developments in that field.

The Johnson Recording Oscillometer Its Use in the Study of Arterial Circulation

Carl A. Johnson. $5.00. Pp. 112, illustrated. Pergamon Press, New York, 1959.

Industrial physicians are physicians first and industrial physicians in the second place. Every physician owes it to himself to grow. Every physician whose life is made up of many worlds knows many things that he does not apply in his day by day work and never expects their application.

This book is devoted to a scientific instrument not needed in the usual industrial medical clinic, but this book could add just one more world to the physician with a highly developed medical culture.

This text describes a new instrument used for oscillography, its sensitivity and its accuracy, and indicates its present and potential usefulness in experimental and clinical medicine. Among the many features covered are: a detailed analysis of the calibrated arterial volume pulse anywhere in the extremities, the temporal artery, and intraorbital tissues; recordings of the arterial blood pressure in all four extremities of human adults which illustrate that marked differences of blood pressure can be present in different extremities of the same individual; and a study of the medical management of occlusive arterial disease of the extremities with marked subjective improvement in the patient, and objective data showing marked improvement of the arterial circulation in the affected extremity.

The Johnson recording oscillometer can be used to record the systolic blood pressure in the arms and legs; the diastolic pressure in the arms and legs, the temporal artery, and intraorbital tissues; the arterial volume change per heart beat or per minute in the extremities, the temporal arteries, and the intraorbital tissues; and the increased size of the adult skull with each heart beat. By giving a timed, calibrated arterial volume pulse it provides a method of study of the arterial circulation. This in turn provides data on the degree of arterial impairment. Serial studies can be made following treatment to determine the adequacy of the treatment and the degree of improvement from various forms of treatment.

Clinical Toxicology

C. J. Polson and R. N. Tattersall. $10.00. Pp. 589. J. B. Lippincott Co., Philadelphia, 1960.

This book is divided into two parts. The first, a relatively short section, concerns itself with the general considerations of poisons and poisoning. This includes a discussion of poisons versus drugs, laws relating to poisons, a general approach to diagnosis and treatment of poisoning, accidental poisoning in children, professional conduct and the collection of specimens for toxicological examination. The chapter on accidental poisoning in children contains illustrative cases with respect to poisoning from common household medication, particularly those available in the form of sugar-coated tablets, which may be ingested in large quantities.

Part two of this book takes up the common poisons on an individual basis. Materials such as cyanides, arsenic, mercury, lead, phosphorus, alcohol, etc., are treated in considerable detail. This coverage includes sources of toxic materials, absorption, excretion, tissue distribution, diagnosis, and treatment. Many accidental and homicidal illustrative cases are presented in each chapter. The final chapters discuss such topics as mushroom poisoning, insect poisoning, insulin overdosage, and carbon monoxide poisoning.

As the title implies, this is a book of Clinical Toxicology. To quote the authors, "This book is intended primarily to describe the clinical features of poisoning in the home. Industrial poisoning and toxicological analysis are adequately described by others and trespass into their fields, therefore have been avoided wherever possible."

For the practicing physician, this book is an excellent source of information on the common poisons. The book is written in a clear and interesting style, making pleasant, informative reading as well as proving a valuable reference work for the physician who may suddenly be presented with an acute poisoning case which calls for his immediate action.

—HERBERT CORNISH

Kranz Manual of Kinesiology

Clem W. Thompson. Fourth edition. $3.75. Pp. 159, illustrated. C. V. Mosby Company, St. Louis, 1961.

Kinesiology is that branch of science that relates to body mechanics with particular reference to joint and muscular system as involved in motion. In this country the study of kinesiology almost exclusively is related to sports and muscular training. Kinesiology is an essential part of physical culture. The emphasis of this book under review is in that direction.

Kinesiology is well neglected in occupational health programs and practices. Many opportunities exist for major investigations of the kinetic system of industrial workers. Industrial workers have muscles, joints, bones, sinews, all of which must be applied in an endless diversity at work operations. Adequate investigative work as to the optimum utilization of these systems never has been conducted.

This manual, not addressed to industrial physicians by the author, is addressed to industrial physicians by this reviewer in the hope that some few will be motivated to develop the kinesiology of industrial workers.

Management of Fractures, Dislocations, and Sprains

H. Earle Conwell and Fred C. Reynolds. Seventh Edition. $27.00. Pp. 1153, 1227 illustrations. C. V. Mosby Co., St. Louis, 1961.

This is the 7th Edition (since 1934) of a popular text, in which Dr. Reynolds has replaced Dr. J. Albert Key, deceased, as an author. Its 1153 pages contain 1227 illustrations, most of which are excellent. In general, a conservative approach to treatment is emphasized, although the indications for operative treatment are clearly stated. For example, earlier operation in cases of delayed union is preferred to long, continued immobilization. Theoretical discussions are minimal. There is a good discussion of anesthesia with particular reference to its use in injured patients. The junior surgical resident can learn much from the description of the proper use of plaster of Paris. Two myths are exploded: a positive serology is of no importance, and calcium by mouth is of no value, in the healing of fractures in otherwise normal persons.

Brown and Fryer's chapter on fractures of the face and jaws is prefaced by a few pages on anatomy which explains the usual deformities and the principles of reduction. The short discussion of nasal fractures well covers an important injury. There is an excellent discussion of the treatment of stable compression fractures of the spine, and it is pointed out that hyperextension and prolonged immobilization usually result eventually in the same deformity seen originally. "Since we discontinued reduction and immobilization of these compressed but stable fractures of the spine, no patient has required a spinal fusion operation for a persistently painful back." Surgeons in industry should read this chapter, as too many of them feel compelled to pursue a long continued therapy program for most spinal fractures. The text particularly emphasizes that fractures of the transverse and spinal processes are not serious injuries and should not be over-

treated. On page 297 is a discussion of what to tell the patient to minimize a prolonged disability. The proper psychological approach to the patient with the so-called "whip lash" injury of the neck and the proper management insures that "almost no case becomes permanently disabling." The author's attitude regarding early settlement of compensable neck injuries would be interesting, but it is not mentioned.

Fracture dislocation of the spine associated with spinal cord injury is adequately discussed on pages 320 to 328. The Queckenstedt test is not reliable, and myelography should precede operative intervention in such cases. "In complete paralysis with fracture dislocation of the spine, in which anatomic reposition of the dislocation has been accomplished, one may expect very little, if any, benefit from laminectomy." Exploration should not be denied if desired by the patient or relatives. These statements sum up the majority view on this subject.

A somewhat surprising statement about spondylolisthesis and spondyloschisis is "there is no evidence that either of these lesions is based upon a developmental anomaly." A few lines further on is the admission that they are "rarely seen even after massive trauma," and "in most cases there is no history of injury." The discussion of the conservative treatment of lesions of the intervertebral discs in the low back, and of the indications for surgical treatment, is good.

Fat embolism, ossifying hematoma (at the elbow) and recurrent shoulder dislocations are adequately discussed. Parham bands are returning to popularity, but the use of them is only briefly mentioned. Nothing is said of the use of anticoagulants, except that they may delay union. Sudeck's atrophy deserves more than half a page. Gas gangrene antitoxin is dismissed as of no value, "unless there is some benefit to local installation." There are good illustrations on how to strap a chest (for broken ribs) with adhesive tape, followed by the statement that an elastic binder is better.

The latter two thirds of the text is devoted to specific injuries of the pelvis and extremities. This reviewer was impressed particularly by the discussion on the treatment of acromioclavicular separations, bursitis and periarthritis of the shoulder (for which x-ray therapy is approved), the management of elbow fractures in children, injuries of the hand by Arthur H. Stein, Jr., indications for the use of a prosthesis in fresh fractures of the neck of the femur, and the management of os calcis injuries.

The authors no longer recommend abduction plaster casts or lateral traction in the treatment of fractures of the upper end of the humerus. The hanging cast is approved in many humeral fractures. Displaced fractures of the head of the radius in children can be reduced, and should never be excised. A comfortable arm sling is shown in Figure 621. "All fractures of the neck of the femur in persons who walked up to the time of the injury and whose condition indicates a reasonable chance of walking again should be treated surgically" is a statement which illustrates the progress in orthopedics over the years. This book can be recommended to all who treat musculoskeletal injuries.

—CHESTER C. GUY, M.D.

Proceedings: Thirteenth International Congress on Occupational Health, July 25-29, 1960

Edited by the U. S. Executive Committee of the Congress. $7.50. Pp. 1005, illustrated. Book Craftsmen Assoc., New York, 1961.

The published scientific Proceedings of the 13th International Congress on Occupational Health are a credit to all who engaged in their preparation. This includes the Organizing Committee, the Scientific Program Committee, the editors, the authors, the photographers and the sponsors who provided funds making publication possible. At this Congress in July of 1960 in New York City approximately 300 papers were presented in 35 sessions. In the usual proceedings the presentations follow the session programs, but in the present Proceedings this procedure has been abandoned. Instead, the papers have been assembled by subject matter in 10 divisions in which all papers are closely or somewhat related. These include Administrative Practices, Surgical Practices, Medical Practices, Education and Training, Environmental Hygiene, Social and Legal Aspects, Influence of Environmental Factors on Health, Work Physiology and Psychology, General, Maximum Allowable Concentrations.

In view of the fact that representatives from 51 countries attended this Congress it might be assumed that this multiplicity of languages would so hamper the official Proceedings that little appeal would appear for the usual reader. Not so in the present instance. To the credit of the editors and the authors it has proved possible to present the majority of these 300 scientific presentations in the English language. A smaller number of publications appear in French, German, Spanish, and Italian.

This large volume is no textbook on occupational health and was not so designed. It is a panorama of occupational health on a world basis such as existed in 1960, but by no means are these scientific pronouncements confined to the year mentioned. For many years to come the

contents of this volume will influence occupational health in all countries.

Although the prime purpose of this publication is to provide a record of scientific presentation, it goes further and presents extensive information on the Permanent Commission that governs the various congresses, its activities, the officers of the Commission and the Congress, various committees, various social events, some items on the history of this 13th International Congress, and most important of all a list of donors of funds who supported this Congress and made possible the publication of this handsome record.

Copies of this book may be obtained from R. E. Eckardt, M.D., Office of the Secretary-General, P. O. Box 45, Linden, N. J.

Personnel Administration, A Point of View and a Method

Paul Pigors and Charles A. Myers, editors. Fourth edition. $7.95. Pp. 749. McGraw-Hill Book Co., Inc., New York, 1961.

The usual industrial physician is reluctant to move out of his particular territory — his medical department. There he is so busy that he convinces himself that he should not share in the activities of kindred personnel departments, except when such activities are closely concerned with medical matters. Actually, the industrial physician is closer to personnel administration than he wants to admit. This book serves admirably as a ladder upon which to climb over his fenced-in department into the world of personnel administration. That means then a larger world and a larger world means growth.

The authors present a consistent philosophy of personnel administration. In contrast to other books on the subject, which stress the "How to do it" approach, this text tries to answer the important question: "Why is the personnel function of management important, and how can it be implemented?"

Part I covers the entire range of recognized personnel activities, stressing philosophy and approach rather than details. Part II emphasizes the value of case study in management development. As this is not a "manual," few techniques and procedures will be found. What the authors stress here are philosophy, approach, point of view, and general method.

The new fourth edition is addressed to four classes of readers: (1) students anticipating a career in line management which involves understanding of the personnel point of view, or a possible career in personnel administration; (2) people currently and actively engaged in personnel administration; (3) executives and administrators who wish to develop and maintain a comprehensive system of personnel policies for all company employees; and (4) all line supervisors who are interested in achieving efficient production at minimum cost and maintaining a stable and satisfied labor force.

Scientific Reports on Industrial Hygiene and Occupational Diseases in Czechoslovakia, 1959

Volume IV. Free of Charge. Pp. 143. Published by Institute of Industrial Hygiene and Occupational Disease in Prague, Prague, 1960.

This is an editorial disguised as a book review. In many countries of Europe, large and small, there are operated distinguished institutes devoted to occupational health. The Institute of Industrial Hygiene and Occupational Diseases in Prague serves as an admirable example. In its report for 1959 is listed abstracts of 295 publications representing some 337 authors. All of these publications are directly related to occupational health. Some are exhaustive while others are of lower order constituting, for example, two case reports of occupational cataract caused by x-ray irradiation. This entire report is impressive but is not extraordinary since other early volumes are similar and since reports from other institutes in other countries are of similar order.

Now the wonder begins. In the United States there exists a fair number of medical and hygienic centers devoted to occupational health. It is not known that any such institute has ever had any early output near to 295 titles; nor may it be believed that any United States institute has a staff near to 337 investigators. In the United States any institute devoted to occupational health that has an annual output near to the 25 mark is likely to be smug in its satisfaction over any such accomplishment. Just why this disparity exists is an enigma. Maybe the energy and ambition of our confreres in Europe may teach us much. We bow in admiration before the high quantity and the high quality of the scientific output of just one of Europe's institutes devoted to occupational health.

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Fate of Carbon Monoxide

The classical experiments of Haldane[1] have been cited for over 50 years to show that carbon monoxide is physiologically totally inert, except for the one basic reaction with hemoglobin. These nineteenth century investigations disclosed that mice acted normally when exposed to one atmosphere of carbon monoxide and two atmospheres of oxygen. Under these circumstances all the hemoglobin was combined with carbon monoxide and the tissues of the animal were nourished with oxygen solely from the oxygen dissolved in serum. The union and affinity of carbon monoxide for hemoglobin has served well over the years as an explanation for the symptoms of asphyxia. Perhaps, it is time, as suggested by Goldsmith of the California State Department of Public Health in Berkeley, to take a re-look at the behavior of carbon monoxide in the body. New techniques such as the use of radioactive carbon and other quantitative procedures offer us tools that were not available to Haldane.

Some quantitative studies of this kind have been done. In 1945, a group of investigators worked in the laboratory of Dr. John H. Lawrence[2] in Berkeley to elucidate the fate of carbon monoxide in the body. Carbon monoxide was prepared by using radioactive carbon. After inhalation with a formation of carboxyhemoglobin, 97% of the carbon monoxide was recovered from the expired air in four hours. It was demonstrated, however, that 0.1% of the inspired carbon monoxide had been converted to carbon dioxide. These results are interesting, and the experiment certainly should be repeated in other laboratories to see if this conversion of a small amount of carbon monoxide into carbon dioxide is a constant phenomenon. This group in Berkeley also called attention to a concentration of carboxyhemoglobin in certain organs such as the liver and hypothesized that this concentration of carboxyhemoglobin was due to blood stasis.

The lack of uniformity in blood levels of carbon monoxide in different individuals has been demonstrated. Goldsmith[3] and Ringold demonstrated on 84 Oakland and Los Angeles patients that there was considerable variation in levels of carbon monoxide in expired air. The gradient of carbon monoxide in the expired air varied from over 30 parts per million down to one part per million. In general, the higher levels were found in smokers, but this was not invariable (of the 38 showing carbon monoxide above 10 parts per million, all but two smoked cigarettes).

It is fruitless to attempt to explain these differences. The ubiquity of carbon monoxide is beyond control in the usual clinical group. Goldsmith's studies were upon patients coming into the offices of physicians in the practice of internal medicine. Unappreciated exposures from cigarette smoke, poorly ventilated automobiles or buses and other unnoticed exposure could contribute to the spread of the carbon monoxide levels. Furthermore, it seems almost certain that the excretion of carbon monoxide in the expired air will be uneven when the levels of carboxyhemoglobin are only 1 or 2%.

It is intriguing to speculate that continuous determination of carbon monoxide in expired air might show variations due to depots of stagnant blood in the liver, spleen or the extremities. Contraction of the spleen and pressure on the liver by a deep respiration or motion of the extremities could mobilize these depots and thus cause an increase in circulating carboxyhemoglobin. It is not difficult to imagine how certain clinical conditions would slow up excretion of carbon monoxide. Any mechanism resulting in the bypass of blood past the pulmonary alveoli would necessarily slow up the process. Any area of consolidation or of fibrosis of the lungs would delay the excretion of carbon monoxide. A prolonged circulation time would accomplish the same results. These factors should be considered by any clinician supervising the care of a patient who has been exposed to carbon monoxide asphyxia.

Is there such a thing as endogenous production of carbon monoxide? While contrary to the views of the first quarter of this century when no one even proposed that carbon monoxide was generated within the body, it now seems clear (Sjorstrand's work, as quoted by Goldsmith) that carbon monoxide is indeed generated in the hemolytic diseases.[4] This is an engaging discovery and should be pursued further. A corollary exists in the demonstration that carbon monoxide is generated by algae. This discovery was made when tanks of algae were utilized in a closed system in a scheme devised for the breakdown of carbon dioxide in a space vehicle cabin. This brings up the last matter to be considered.

Does carbon monoxide produce changes in the body other than the changes secondary to anoxia? At the present time the weight of evidence appears to be against this concept. No phase of carbon monoxide intoxication, however remote, is unworthy of careful investigation. Only completely closed systems, obviating the minutest leak of carbon monoxide should be employed. It would seem that investigation of the possibility of carbon monoxide entering into chemical combinations with effects on enzyme systems will have to be studied with isotopic tracer techniques in order to determine with certainty whether the effects observed are not secondary to the anoxia produced by carboxyhemoglobinemia.

—F. H. SHILLITO, M.D.

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The Dead Snake that Came Alive

A few years ago a happy aphorism was that gonorrhea was the only infectious disease that might arise in one victim twice in a single week. That statement was true then and still is true. Syphilis was brushed aside with almost the same optimism. The foolish fancy that the venereal diseases no longer constituted a major medical difficulty has boomeranged into a national disaster.

The *Illinois Health Messenger*, the monthly publication of the Illinois Department of Public Health, provides this comment:

"In 1955, an unexpected upturn in venereal disease now has reached an appalling height.

"A million new gonorrhea cases are developing each year, and the increases in syphilis average 200% over a period of three years throughout the country. One large city in Louisiana showed an increase in syphilis of over 800%!

"Teenagers and young adults have become primary victims. More than half of the new VD cases are in the 15-24 year age group, according to U. S. Public Health Service.

"During the first 10 months of 1960, there were 18,813 cases of gonorrhea reported in Illinois, with 16,230 of these cases occurring in Chicago. In addition, there were about 5,000 suspected cases treated in Chicago.

"During this same period, there were 7,230 reported cases of syphilis in the state, with

5,852 of this number occurring in Chicago. These are provisional statistics, but the final figures shouldn't vary too much.

"There are several explanations offered for this frightening return of venereal disease. One is that the American public was so convinced that penicillin was such a quick, sure, and painless antidote to venereal disease, that precautions and interest lagged. Public apathy was followed by diversion of governmental funds for VD control to other purposes, according to one health official in an article in *Today's Health* magazine.

"It has been discovered that the so-called sure-shot penicillin cure is no longer the infallible treatment. A new strain of penicillin-resistant gonococci is emerging, according to a WHO official, who says that as many as 30% of new cases of gonorrhea no longer respond to penicillin. What's more, the gradually increasing use and misuse of penicillin has made more people sensitive to the antibiotic, which precludes its use.

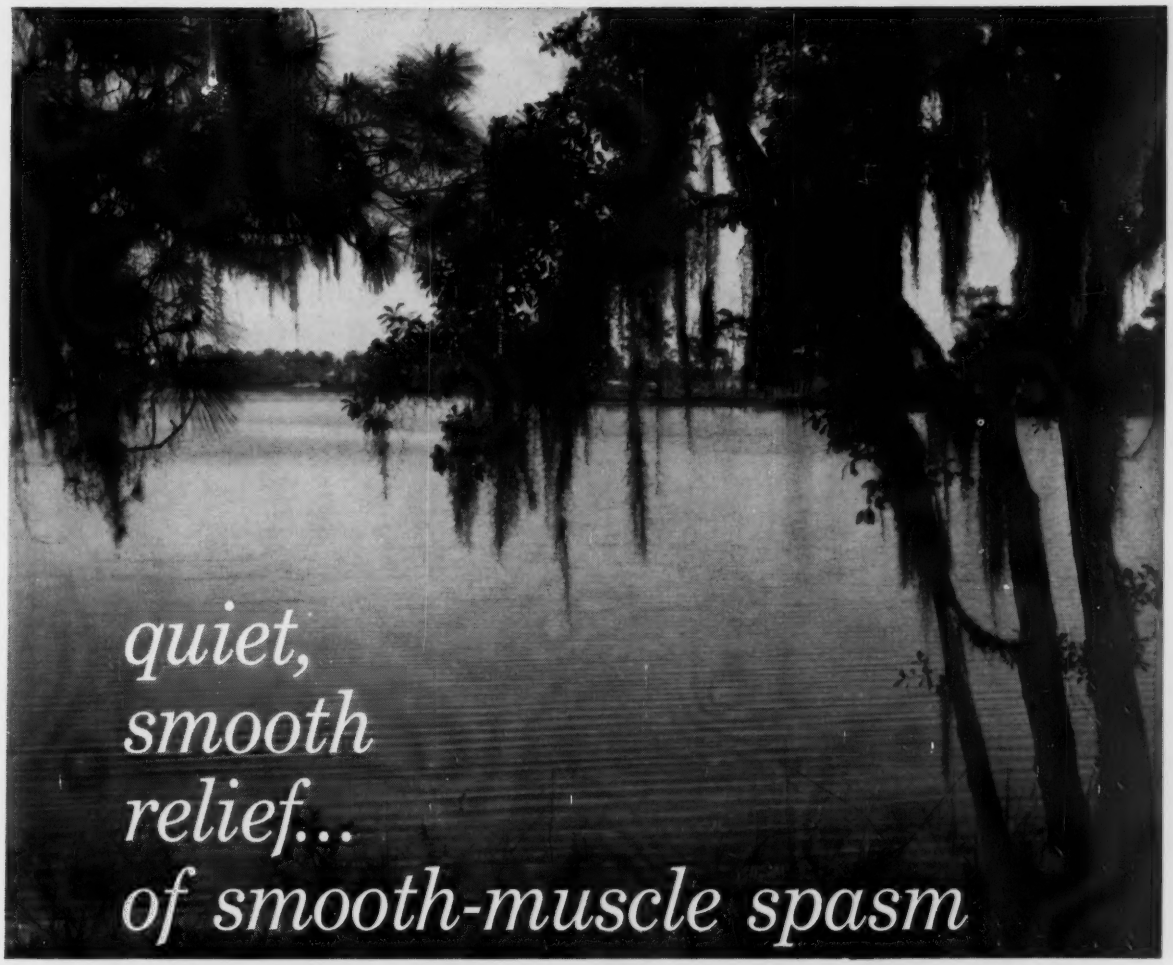
"Another cause mentioned for the VD comeback is the increased mobility of our population, which helps spread infection quickly from city to city, and even state to state.

"But the most important reason of all is the decline in the country's moral standards, with particular emphasis on the teenage population, according to the American Social Hygiene Association. This Association has and is still conducting studies on adolescent behavior, and they are coming up with the same answer: parents are lax in setting proper rules and standards, and good examples for their children. In short, parents must be assessed a major share of the blame for moral decay in children. It is no coincidence that cities and states which report sharp upswings in VD rates also report a jump in juvenile delinquency figures, according to juvenile authorities."

The emphasis of that comment is upon the juveniles, the teenagers. These teenagers have a way of aging into the twenties and into the thirties. Those teenagers find their way into industry as workers and bring with them their venereal diseases and their ideas as to morality. Never is it the function of industrial medicine to treat venereal diseases. No such disease is attributable to industry as the cause. Treatment and cure rests with the workers' private medical arrangements. Yet the victims of venereal diseases are not prized as workers. Toward VD banishment many industrial medical departments in years only recently passed maintained active services for the detection of venereal diseases and for the counseling of victims. In the mischievous belief "that venereal diseases no longer are important," this portion of the industrial medical program crumbled.

It is still not the job of the industrial physician to control venereal diseases in his plant's workers. That is a public health requirement. Still, if what was performed in industry a few years ago was praiseworthy as good medicine, then that opportunity has returned. In truth the need never disappeared.

Reluctantly it must be admitted that the pesky organisms that cause gonorrhea and syphilis have licked the doctors. So far they are the victors. They stalk the land in arrogance and defiance.



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An important aspect to be considered in an analgesic is its *better total effect* on the patient experiencing pain. For years, the use of Anacin® after minor surgery has enjoyed wide preference among the profession. Anacin Tablets provide rapid and protracted analgesia without the necessity of resorting to narcotics or barbiturates. In addition, Anacin exceeds the benefits of plain aspirin or buffered aspirin by reducing tension, anxiety and inducing a more relaxed effect—thereby giving a *better total effect*. Excellent tolerance with no gastric upsets.

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COMMENT AND OPINION

An End to Molly-Coddling

A health specialist at The University of Michigan urges a "get tough" policy to counteract the flood of traffic deaths and injuries caused by drinking drivers.

Seward E. Miller, M.D., Director of the University of Michigan Institute of Industrial Health says, "We can begin by finding a better word than 'accident.' An 'accident' implies the event is out of the hands of the driver. But drunk driving is entirely the personal responsibility of the driver, and he should be held firmly accountable for his acts."

Writing in the current (May-June) issue of *Police* magazine, Dr. Miller recommends four steps in cracking down on drinking drivers:

1) A strong campaign to declare drunken driving a serious crime against the public safety.

2) Correction of existing laws so that drunken driving is judged on the basis of modern scientific knowledge.

3) Adoption of new laws to provide severe penalties for drunken driving.

4) Rigid enforcement, staunch public support of the police agencies and an end to popular molly-coddling of drunks.

Dr. Miller points out that present laws consider an individual "under the influence" only when his blood alcohol test is above 0.15. Modern scientific knowledge shows driving ability is impaired at about 0.04% alcohol in the blood.

In urging the attack on drinking drivers, he states, "Evidence has been piling up for years pinning the cause of accidents right on the individual. We must get the concept across that driving is a privilege to be prized and cherished, and that when an individual behaves in a way that endangers public safety he should be denied the privilege of driving.

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"In about 50% of fatal auto accidents, a drinking driver is involved. If we had such clearcut evidence about the cause of cancer, there would be a booming public outcry to put an end to it."

Polluted Guinea Pigs

A major research project is now underway which should add valuable information to what is known about the health effects of air pollution. The study is a joint project of the Los Angeles County Air Pollution Control District, and the University of Southern California to observe the effects on laboratory animals of breathing the same air breathed by people in Los Angeles County. The study represents the largest effort of its kind yet undertaken in the field of air pollution.

The contaminants of primary interest are those specifically associated with automobile exhaust — hydrocarbons, oxidant, carbon monoxide, oxides of nitrogen, and certain particulates.

While the test animals breathe the air at special sites located at varying distances from the heavily traveled throughways, a control group of similar animals will be living in purified air from which contaminants have been removed.

Commenting on the agreement, Dr. L. Otis Emik, Division of Air Pollution, Public Health Service, said, "In this field of study we have long needed careful observations of the effects on laboratory animals of precisely the same exhaust contaminated air which people breathe. These observations may give us the opportunity to observe in animals, during short periods of time, effects which in human beings might take decades to occur."

How to Handle with Care

In an effort to make available to the military services and applicable government agencies and their contractors technical information on the safety aspects of manufacture, handling, storage and transportation of rocket propellants, the Manufacturing Chemists' Association, Inc. has organized a chemical propellant safety subcommittee.

The technical group, which will operate under the guidance and direction of the Association's General Safety committee is composed of representatives of a dozen chemical propellant manufacturers. Chairman of the technical subcommittee is Ralph Bloom, Jr. of Food Machinery and Chemical Corp. and vice chairman is James G. Chalfant of Olin Mathieson Chemical Corp.

The rocket propellant safety group also expects to publish safety data sheets, when such sheets appear to be necessary, and to assist the military services and others in establishing uniform standards of safety.

In a recent letter to Secretary of Defense McNamara informing him of the formation of the committee, General John E. Hull, MCA President, emphasized that the MCA through its general safety committee "has

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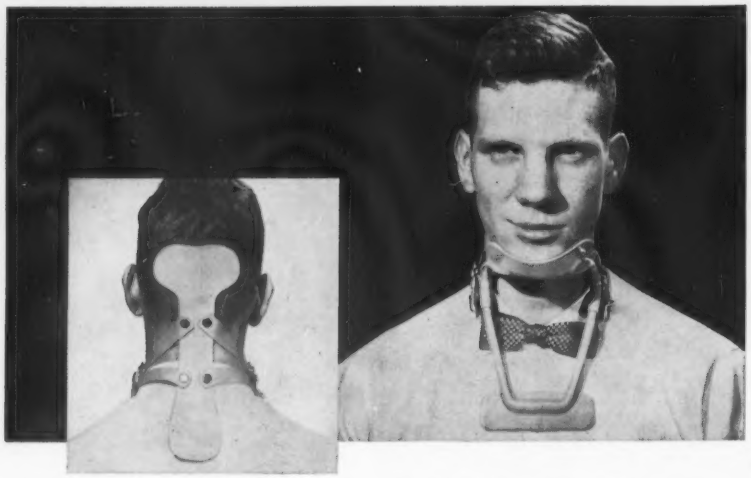

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*PATENT PENDING

[1]From Jackson, R.: The Cervical Syndrome, 2nd Ed., Springfield, Ill., Courtesy of Charles C. Thomas, Publisher, July, 1958, Pg. 155.

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for a long time made studies of safe practices in the storing and handling of chemicals and has made available the results of these studies to the chemical manufacturing and using industries. Through these MCA efforts accepted procedures have been established for a wide variety of chemicals."

In addition, various individual Association member companies which produce rocket propellants have, on occasion, been requested to present to various government agencies and contractors information regarding safe handling and storage of their products. Recognizing the limitation of individual representation, the Association formed the subcommittee to assemble and more effectively disseminate results of their industrial experience. It is expected that nonpetroleum liquid propellants would receive early attention by the group.

Safety Data Sheets

Chemical Safety Data Sheet SD-82, listing the properties and essential information for safe handling and use of Toluidine is now available from the Manufacturing Chemists' Association, Inc., 1825 Connecticut Ave., N. W., Washington 9, D. C.

The data sheet discusses the properties, hazards, engineering control of hazards, employee safety precautions, fire fighting procedures, safe handling and storage practices, tank and equipment cleaning and repairs, waste disposal, medical management, first aid.

Two safety data sheet supplements on hydrogen peroxide are also available from the Association. Supplement SD-53-A details the physical properties and provides minimum engineering design recommendations for bulk storage facilities for hydrogen peroxide solutions not exceeding 52% concentration by weight. There is an increasing interest on the part of consumers in installing tank storage facilities at their plants for operating convenience in order to accommodate bulk purchases.

Supplement SD-53-B reveals the properties and recommended practices for packaging, handling, transportation, storage, and use of hydrogen peroxide solutions exceeding 52% concentration by weight.

Concentrations of hydrogen peroxide above 52%, generally known as High Strength Hydrogen Peroxide, are commodities of increasing interest in commercial and military fields. Included in the information available in Supplement SD-53-B are important physical and chemical properties, uses, regulations, shipping containers and labels, bulk storage and handling equipment, safety precautions, and general information.

Copies may be obtained from the Manufacturing Chemists' Association (at the above address) at a cost of 30¢ each for Supplement A and 50¢ each for Supplement B.

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*Edelstein, A. J.: Pennsylvania M. J. 62:1831 (Dec.) 1959.

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after arbitrary retirement age, the Easter Seal Research Foundation has announced creation of new and significant awards. These awards will be known as the Distinguished Service Awards for Professors Emeriti.

First recipient of one of the awards is an obstetrician, Nicholson J. Eastman, M.D., of Johns Hopkins University, Baltimore, Md., who for two years will continue his study of the obstetrical background of cerebral palsy under the Easter Seal grant.

As stated by the Foundation's announcement, the new awards are intended "to encourage and facilitate continued research in the field of crippling by retired university professors who have demonstrated distinguished research competence prior to retirement."

Awards will be made only to retired full professors who devote substantial time to research and who will have a continuing research opportunity in a university or other major research facility. Individuals in nonmedical fields related to rehabilitation of the crippled are also eligible for consideration.

How Dry They Are

Brewery workers in London returned to the job after a brief strike. The British workers set up strike headquarters in a pub near the brewery. To their dismay, they found that their walkout cut off their own beer supplies at the pub.

—*Industrial Relations News*, March 4, 1961.

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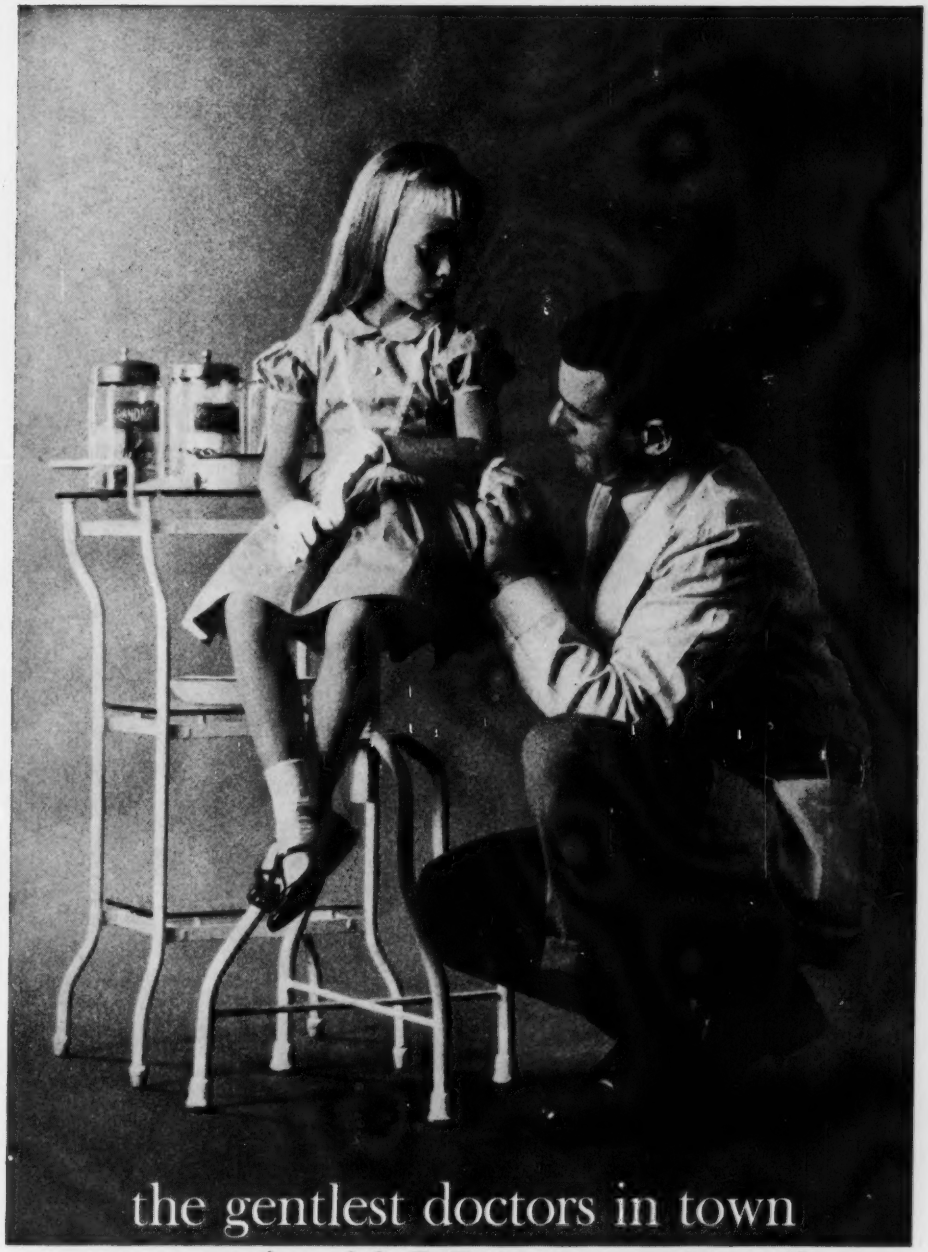

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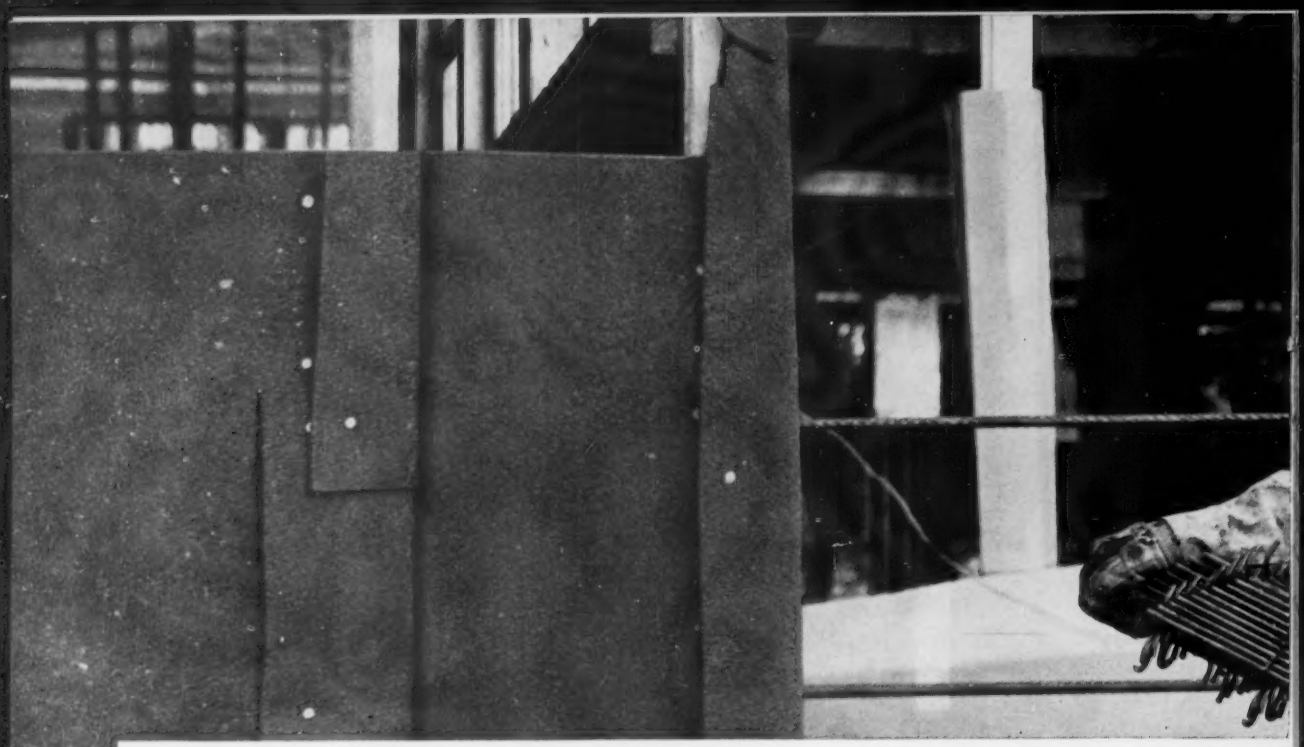

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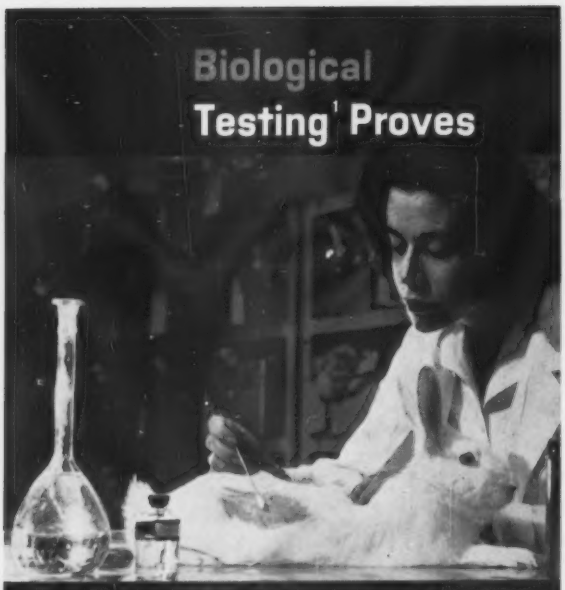
Kestler reports in J.A.M.A. (April 30, 1960) that conventionally treated low-back syndrome patients required an average of 41 days for full recovery (range: 3 to 90 days). The addition of Soma therapy in this comparative investigation reduced the average to 11.5 days (range: 2 to 21 days). With Soma, patients averaged full recovery 30 days sooner.



Biological Testing[1] Proves the Virtual Absence of Toxicity in go-jo creme hand cleaner

PHASE I: Groups of Swiss mice received daily injections of Go-Jo Creme Hand Cleaner.[2] After seven days, body weights were recorded and the animals of one group sacrificed for gross pathology. The remaining animals received injections for three weeks and then were sacrificed and autopsied. The absence of mortality, weight loss, change in organ weights and gross pathology evidenced Go-Jo Creme Hand Cleaner's virtual freedom from systemic toxicity.

PHASE II: Albino rabbits were grouped and their flanks shaved. The experimental group was further divided, and the skin of one subgroup was abraded. For two weeks the subjects received daily applications of Go-Jo Creme Hand Cleaner. After a thirty-day observation period the animals were sacrificed and autopsied for gross pathology. Specimens of control and treated skin underwent histological examination for the appearance of pathological changes. The virtual absence of gross and microscopic pathology following prolonged topical application evidenced Go-Jo Creme Hand Cleaner's relative freedom from dermal toxicity.

The tests confirmed the virtual absence of subacute or chronic dermal or systemic toxicity and established the relative safety and freedom from toxic irritants of Go-Jo Creme Hand Cleaner.

1. Methods recommended by The Association of Food and Drug Officials of the United States for the appraisal of the safety of chemicals in foods, drugs and cosmetics.

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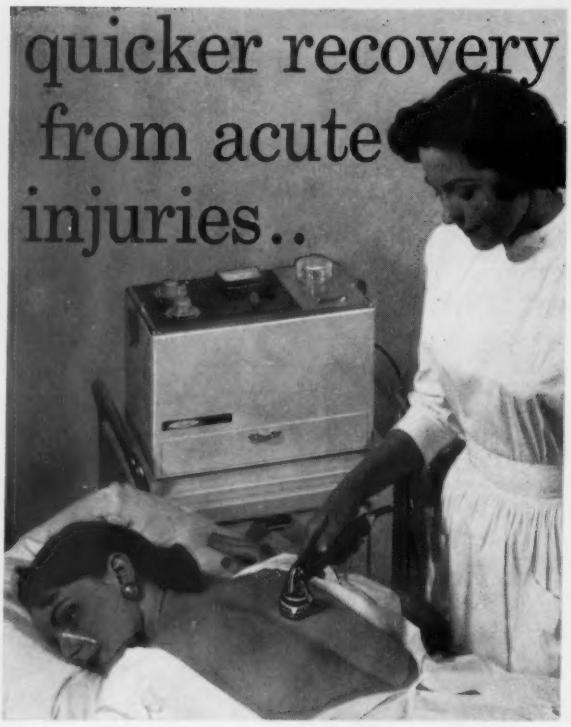

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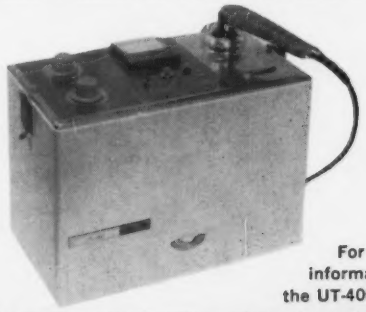

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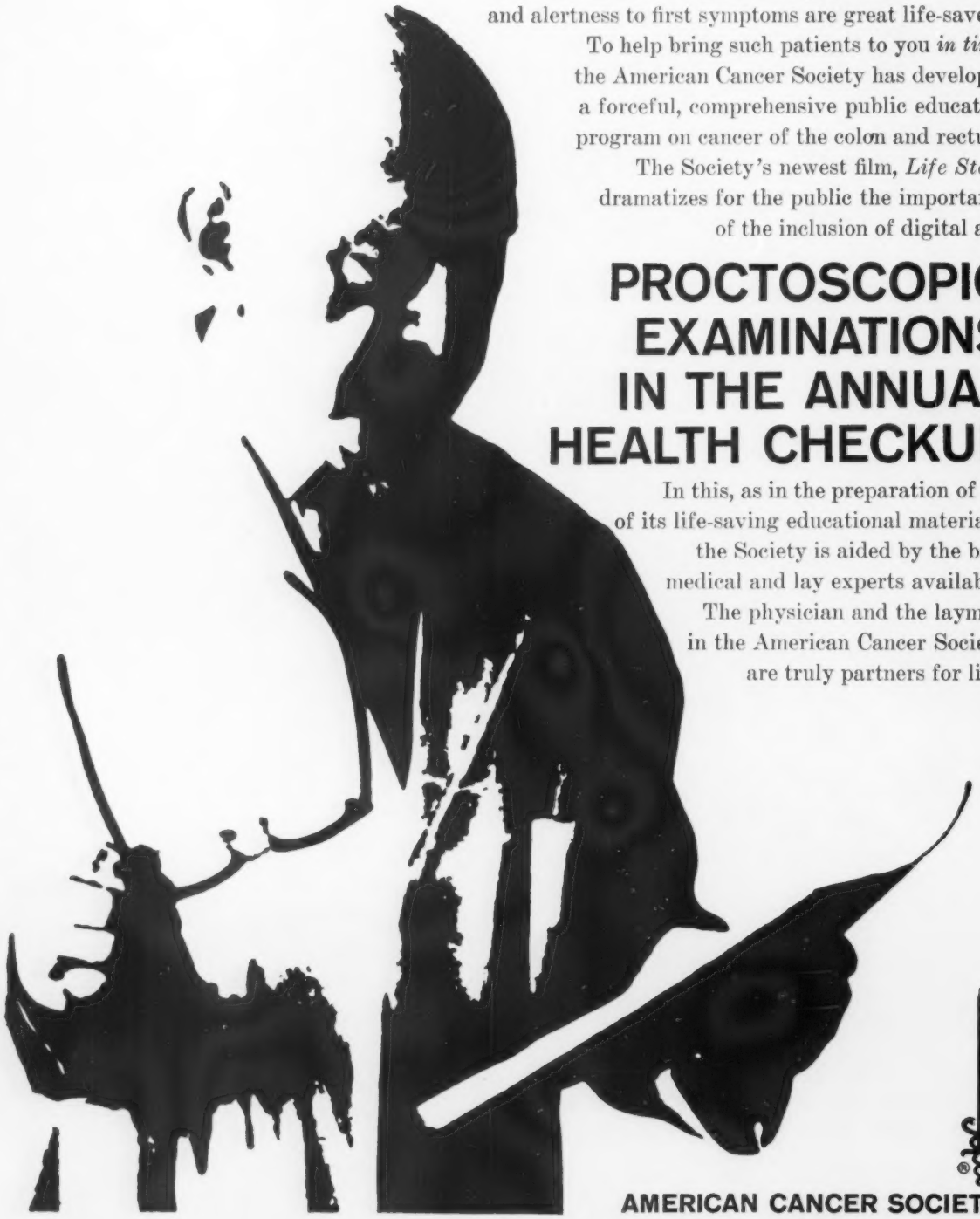

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for relief of anxiety and tension

Outstandingly Safe

1. simple dosage schedule produces rapid, dependable tranquilization without unpredictable excitation
2. no cumulative effects, thus no need for difficult dosage readjustments
3. does not produce ataxia, change in appetite or libido
4. does not produce depression, Parkinson-like symptoms, jaundice or agranulocytosis
5. does not impair mental efficiency or normal behavior

Miltown®

meprobamate (Wallace)

Usual dosage: One or two 400 mg. tablets t.i.d.
Supplied: 400 mg. scored tablets, 200 mg. sugar-coated tablets; in bottles of 50.

Also supplied in sustained-release capsules . . .

Meprospan®

Available as Meprospan-400 (blue-topped *sustained-release* capsules containing 400 mg. meprobamate), and Meprospan-200 (yellow-topped *sustained-release* capsules containing 200 mg. meprobamate).

WALLACE LABORATORIES / *Cranbury, N. J.*